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Union Calendar No. 614

106th Congress, 2d Session – – – – – – – – – – – – House Report 106–1052

SUMMARY OF ACTIVITIES

OF THE

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

FOR THE

ONE HUNDRED SIXTH CONGRESS

JANUARY 2, 2001

JANUARY 2, 2001.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

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U.S. GOVERNMENT PRINTING OFFICE

68–008 WASHINGTON : 2001

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F. JAMES SENSENBRENNER, JR., Wisconsin, *Chairman*

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LETTER OF TRANSMITTAL

House of Representatives,
Committee on Science
Washington, DC

January 3, 2000

The Honorable Jeff Trandahl
The Clerk
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Trandahl:

In compliance with Rule XI, Clause 1(d) of the Rules of the House of Representatives, I hereby submit the Summary of Activities for the Committee on Science for the 106th Congress.

The purpose of this report is to provide the Members of the House of Representatives, as well as the general public, with an overview of the legislative and oversight activities conducted by this committee, as defined by Rule X, Clause 1(n) of the Rules of the House of Representatives.

This document is intended as a general reference tool, and not as a substitute for the hearing records, reports, and other committee files.

Sincerely,

F. JAMES SENSENBRENNER, JR.
Chairman

Enclosure

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Union Calendar No. 614

106TH CONGRESS, *2d Session* " HOUSE OF REPRESENTATIVES ! REPORT 106–1052

SUMMARY OF ACTIVITIES—COMMITTEE ON SCIENCE

JANUARY 2, 2001.—Committee to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. SENSENBRENNER, from the Committee on Science, submitted the following

REPORT

HISTORY OF THE COMMITTEE ON SCIENCE

The Committee on Science has its roots in the intense reaction to the Soviet launch of Sputnik on October 4, 1957. Early in 1958 Speaker Sam Rayburn convened the House of Representatives, and the first order of the day was a resolution offered by Majority Leader John McCormack of Massachusetts. It read, "Resolved that there is hereby created a Select Committee on Astronautics and Space Exploration . . ."

The Select Committee performed its tasks with both speed and skill by writing the Space Act creating the National Aeronautics and Space Administration and chartering the permanent House Committee on Science and Astronautics, now known as the Committee on Science, with a jurisdiction comprising both science and space.

The Science and Astronautics Committee became the first standing committee to be established in the House of Representatives since 1946. It was also the first time since 1892 that the House and Senate acted to create a standing committee in an entirely new area.

The Committee officially began on January 3, 1959, and on its 20th Anniversary the Honorable Charles Mosher said, the committee "was born of an extraordinary House-Senate joint leadership initiative, a determination to maintain American preeminence in science and technology, . . ."

The formal jurisdiction of the Committee on Science and Astronautics included outer space—both exploration and control—astronautical research and development, scientific research and development, science scholarships, and legislation relating to scientific

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agencies, especially the National Bureau of Standards, the National Aeronautics and Space Administration, the National Aeronautics and Space Council and the National Science Foundation.

The Committee retained this jurisdiction from 1959 until the end of the 93rd Congress in 1974. While the Committee's original emphasis in 1959 was almost exclusively astronautics, over this 15-year period the emphasis and workload expanded to encompass scientific research and development in general.

In 1974, a Select Committee on Committees, after extensive study, recommended several changes to the organization of the House in H. Res. 988, including expanding the jurisdiction of the Committee on Science and Astronautics, and changing its name to the Committee on Science and Technology.

Jurisdiction over energy, environmental, atmospheric, civil aviation R&D, and the National Weather Service issues was added to the general realm of scientific research and development.

In addition to these legislative functions, the Committee on Science and Technology was assigned a "special oversight" function, giving it the exclusive responsibility among all Congressional standing committees to review and study, on a continuing basis, all laws, programs and government activities involving Federal nonmilitary research and development.

In 1977, with the abolition of the Joint Committee on Atomic Energy, the committee was further assigned jurisdiction over civilian nuclear research and development thereby rounding out its jurisdiction for all civilian energy R&D.

A committee's jurisdiction gives it both a mandate and a focus. It is, however, the committee's chairman that gives it a unique character. The Committee on Science and Technology has had the good fortune to have eight very talented and distinctly different chairmen, each very creative in his own way in directing the committee's activities.

Congressman Overton Brooks was the Science and Astronautics Committee's first chairman, and was a tireless worker on the committee's behalf for the two and one-half years he served as chairman.

When Brooks convened the first meeting of the new committee in January of 1959, committee Member Ken Hechler recalled, "There was a sense of destiny, a tingle of realization that every member was embarking on a voyage of discovery, to learn about the unknown, to point powerful telescopes toward the cosmos and unlock secrets of the universe, and to take part in a great experiment." With that spirit the committee began its work.

Brooks worked to develop closer ties between the Congress and the scientific community. On February 2, 1959, opening the first official hearing of the new committee Chairman Brooks said, "Although perhaps the principal focus of the hearings for the next several days will be on astronautics, it is important to recognize that this committee is concerned with scientific research across the board." And so, from the beginning, the committee was concerned with the scope of its vision.

Overton Brooks died of a heart attack in September of 1961, and the chairmanship of the committee was assumed by Congressman George Miller of California.

Miller, a civil engineer, was unique among Members of Congress who rarely come to the legislature with a technical or scientific background. He had a deep interest in science, and his influence was clearly apparent in the broadening of the charter of the National Science Foundation and the establishment of the Office of Technology Assessment. He pioneered in building strong relationships with leaders of science in other nations. This work developed the focus for a new subcommittee established during his chairmanship, known as the Subcommittee on Science, Research and Development.

Just a few months before Miller became Chairman, President John F. Kennedy announced to a joint session of Congress the national commitment to land a man on the moon and return him safely to Earth before the end of the decade. Thus, during Miller's 11-year tenure as chairman, the committee directed its main efforts toward the development of the space program.

Chairman Miller was not reelected in the election of 1972, so in January of 1973, Olin E. Teague of Texas took over the helm of the committee. Teague, a man of directness and determination, was a highly decorated hero of the second World War. He was a longstanding Member of Congress and Chairman of the Veterans Committee before taking over the chairmanship of the Science and Technology Committee.

Throughout the 1960's and early 1970's, Teague chaired the Science Committee's Manned Space Flight Subcommittee, and in that capacity firmly directed the efforts to send a man to the moon.

As chairman of the committee, Teague placed heavy emphasis on educating the Congress and the public on the practical value of space. He also prodded NASA to focus on the industrial and human applications of the space program.

One of Teague's first decisions as chairman was to set up a subcommittee on energy. During his six-year leadership of the committee, energy research and development became a major part of the committee's responsibilities.

In 1976, Chairman Teague saw the fruition of three years of intensive committee work to establish a permanent presence for science in the White House. The Office of Science and Technology Policy was established with a Director who would also serve as the President's Science Advisor.

Throughout his leadership, he voiced constant concern that the complicated technical issues the committee considered be expressed in clear and simple terms so that Members of Congress, as well as the general public, would understand the issues.

After six years as Chairman, Teague retired from the committee and the Congress due to serious health problems. He was succeeded by Don Fuqua, a representative from northern Florida.

Fuqua became Chairman on January 24, 1979, at the beginning of the 96th Congress.

Don Fuqua came to the Congress after two terms in the Florida State Legislature and was, at age 29, the youngest Democrat in Congress when he was elected in 1962.

Fuqua's experience on the Committee dated back to the first day of his Congressional service. Since 1963, he served as a Member of the Committee's Manned Space Flight Subcommittee. When Olin

Teague became chairman of the full Committee in 1973, Fuqua took Teague's place as chairman of the subcommittee.

As the subcommittee chairman he was responsible for major development decisions on the Space Shuttle and the successful Apollo-Soyuz link-up in space between American astronauts and Soviet cosmonauts. Later, the subcommittee's responsibility was expanded to cover all other NASA activities and was renamed the Subcommittee on Space Science and Applications.

As Chairman of the Committee, Fuqua's leadership could be seen in the expansion of committee activities to include technological innovation, science and math education, materials policy, robotics, technical manpower, and nuclear waste disposal. He worked to strengthen the committee's ties with the scientific and technical communities to assure that the committee was kept abreast of current developments, and could better plan for the future.

During the 99th Congress, the Science and Technology Committee, under Fuqua's chairmanship, carried out two activities of special note.

The Committee initiated a study of the nation's science policy encompassing the 40-year period between the end of the second World War and the present. The intent was to identify strengths and weaknesses in our nation's science network. At the end of the 99th Congress, Chairman Fuqua issued a personal compilation of essays and recommendations on American science and science policy issues in the form of a Chairman's Report.

The second activity was a direct outgrowth of the Space Shuttle "Challenger" accident of January 28, 1986. As part of the committee's jurisdictional responsibility over all the NASA programs and policies, a steering group of committee Members, headed by Congressman Robert Roe, the ranking Majority Member, conducted an intensive investigation of the Shuttle accident. The committee's purpose and responsibility were not only the specific concern for the safe and effective functioning of the Space Shuttle program, but the larger objective of insuring that NASA, as the nation's civilian space agency, maintain organizational and programmatic excellence across the board.

Chairman Fuqua announced his retirement from the House of Representatives at the termination of the 99th Congress. He served 24 years on the Committee on Science and Technology and 8 years as its chairman.

Congressman Robert A. Roe of New Jersey, a long-time Member of the Committee, became its new Chairman at the beginning of the 100th Congress. Congressman Roe was trained as an engineer and brought that broad knowledge and understanding to bear on the Committee's issues from the first day of his tenure.

Congressman Roe's first official act as Chairman was to request a change in the Committee's name from the Committee on Science and Technology to the Committee on Science, Space, and Technology. This change was designed not only to reflect the Committee's broad space jurisdiction, but also to convey the importance of space exploration and development to the Nation's future.

In the 100th Congress, under Chairman Roe's stewardship, the Committee kept close scrutiny over NASA's efforts to redesign and reestablish the space shuttle program. The successful launch of the

Shuttle Discovery in September, 1988 marked America's return to space after 32 months without launch capability.

The vulnerability of having the nation's launch capability concentrated singularly in the Space Shuttle, and the rapid increase of foreign competition in commercial space activities, precipitated strong Committee action to help ensure the competitive posture of the nation's emerging commercial launch industry.

Chairman Roe's leadership to stabilize and direct the nation's space program led to the Committee's first phase of multi-year authorizations for research and development programs with the advent of three year funding levels for the Space Station.

Within the national movement to improve America's technological competitiveness, Chairman Roe headed the Committee's initiative to expand and redefine the mission of the National Bureau of Standards* in order for it to aid American industry in meeting global technological challenges.

The Science Committee has a long tradition of alerting the Congress and the Nation to new scientific and technological opportunities that have the potential to create dramatic economic or societal change. Among these have been recombinant DNA research and supercomputer technology. In the 100th Congress, Members of the Committee included the new breakthroughs in superconductivity research in this category.

Several long-term efforts of the Committee came to fruition during the 101st Congress. As the community of space-faring nations expanded, and as space exploration and development moved toward potential commercialization in some areas, the need arose for legal certainty concerning intellectual property rights in space. Legislation long advocated by the Science Committee defining the ownership of inventions in outer space became public law during this Congress.

Continuing the Committee's interest in long range energy research programs for renewable and alternative energy sources, a national hydrogen research and development program was established to lead to economic production of hydrogen from renewable resources and its use as an alternative fuel.

At the end of the 101st Congress, the House Democratic Caucus voted Representative Roe Chairman of the Public Works and Transportation Committee to fill the vacancy in that Committee's Chairmanship.

The hallmark of Representative Roe's four-year tenure as Chairman was his articulation of science, space, and technology as the well-spring for generating the new wealth for America's future economic growth and long-term security.

At the beginning of the 102nd Congress in January, 1991, Representative George E. Brown, Jr., of southern California became the sixth Chairman of the Science, Space, and Technology Committee. Trained in industrial physics, Brown worked as a civil engineer for many years before entering politics.

Elected to the Congress in 1962, Brown was a member of the Science, Space, and Technology Committee since 1965. During his more than two decade tenure on the Committee before becoming its

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*Now named the National Institute of Standards and Technology (NIST) (P.L. 100–418, Title V, Part B, Subpart A, Sections 511 through 5163, enacted August 23, 1988)

Chairman, he chaired subcommittees on the environment, on research and technology, and on transportation and aviation R&D.

Whether from his insightful leadership as a subcommittee chairman or from the solitary summit of a futurist, Brown brought a visionary perspective to the Committee's dialogue by routinely presenting ideas far ahead of the mainstream agenda.

George Brown talked about conservation and renewable energy sources, technology transfer, sustainable development, environmental degradation, and an agency devoted to civilian technology when there were few listeners and fewer converts. He tenaciously stuck to these beliefs.

Consistent with his long-held conviction that the nation needed a coherent technology policy, Brown's first action as Chairman was to create a separate subcommittee for technology and competitiveness issues. During his initial year as Chairman, Brown developed an extensive technology initiative which was endorsed by the House of Representatives in the final days of the 102nd Congress. The work articulated Brown's concept of a partnership between the public and private sectors to improve the nation's competitiveness.

The culmination of the 102nd Congress saw Brown's persistent efforts to redirect our national energy agenda come to fruition. The first broad energy policy legislation enacted in over a decade included a strong focus on conservation, renewable energy sources, and the expanded use of non-petroleum fuels, especially in motor vehicles.

In Brown's continuing concern to demonstrate the practical application of advances in science and technology, he instituted the first international video-conferenced meetings in the U.S. Congress. In March of 1992, Members of the Science Committee exchanged ideas on science and technology via satellite with counterparts from the Commonwealth of Independent States. This pilot program in the House of Representatives resulted in a decision to establish permanent in-house capacity for video-conferencing for the House.

As a final activity in the 102nd Congress, Brown issued a Chairman's report on the federally funded research enterprise. The work was intended to act as the starting point for a comprehensive review and revision of federal science policy currently in the planning stage.

The 1994 congressional elections turned over control of the Congress to the Republican party. The House Republican Conference acted to change official name of the Committee from Science, Space, and Technology to the Committee on Science. Robert S. Walker of Pennsylvania became the Science Committee's first Republican Chairman, and the seventh Committee chairman. Walker had served on the Science Committee since his election to Congress in 1976, and had been the Ranking Member since 1989.

Chairman Walker acted to streamline the subcommittee structure from five to four subcommittees: Basic Research, Energy and Environment, Space and Aeronautics, and Technology. This action reflected the new Congress' mandate to increase efficiency and cut expenses, and also reflected Walker's personal desire to refocus the Committee's work. Due to the reduction in the number of subcommittees and a sharper focus on the issues, the number of hearings was reduced, while the number of measures passed by the House and signed into law increased.

Chairman Walker chose to use the Full Committee venue to hold hearings exploring the role of science and technology in the future. The first hearing, "Is Today's Science Policy Preparing Us for the Future?" served as the basis for much of the Committee's work during the 104th Congress.

For the first time in recent Science Committee history, the Committee and House of Representatives passed authorizations for every agency under the Committee's jurisdiction. To preserve and enhance the core federal role of creating new knowledge for the future, the Science Committee sought to prioritize basic research policies. In order to do so, the Committee took strong, unprecedented action by applying six criteria to civilian R&D:

1. Federal R&D efforts should focus on long-term, non-commercial R&D, leaving economic feasibility and commercialization to the marketplace.
2. All R&D programs should be relevant and tightly focused to the agencies' missions.
3. Government-owned laboratories should confine their in-house research to areas in which their technical expertise and facilities have no peer and should contract out other research to industry, private research foundations and universities.
4. The federal government should not fund research in areas that are receiving, or should reasonably be expected to obtain, funding from the private sector.
5. Revolutionary ideas and pioneering capabilities that make possible the impossible should be pursued within controlled, performance-based funding levels.
6. Federal R&D funding should not be carried out beyond demonstration of technical feasibility. Significant additional private investment should be required for economic feasibility, commercial development, production and marketing.

The authorization bills produced by the Science Committee reflected those standards, thereby protecting basic research and emphasizing the importance of science as a national issue. As an indication of the Science Committee's growing influence, the recommendations and basic science programs were prioritized accordingly.

During the 104th Congress, the Science Committee's oversight efforts were focused on exploring ways to make government more efficient; improve management of taxpayer resources; expose waste, fraud and abuse, and give the United States the technological edge into the 21st century.

The start of the 105th Congress brought a change in leadership to the Committee. Congressman F. James Sensenbrenner, Jr., a Republican representing the 9th District of Wisconsin, became the eighth Chairman. Sensenbrenner had been a member of the Committee on Science since 1981 and prior to his appointment as Committee head, he served as Chairman of the Subcommittee on Space and Aeronautics.

Under Chairman Sensenbrenner's leadership, the Committee on Science worked in a bipartisan fashion to report out a significant number of legislative initiatives focused on advancing U.S. interests in research and development. Throughout the 105th and 106th Congresses, the Science Committee aggressively implemented the

Government Performance and Results Act (Results Act), legislation making federal agencies accountable for the money they spend.

At the start of the 105th Congress, the Speaker of the House charged the Committee on Science with the task of developing a long-range science and technology policy. Chairman Sensenbrenner appointed the Committee's Vice Chairman, Vernon Ehlers, (R–MI) to lead a study of the current state of the Nation's science and technology policy. The National Science Policy Study, entitled "Unlocking Our Future: Toward A New National Science Policy" was unveiled in September 1998 and was endorsed by the Full House on Oct. 8, 1998, and serves as a policy guide to the Committee, Congress and the scientific community.

Chairman Sensenbrenner made oversight one of his top priorities and as a result of the Committee's aggressive agenda, Majority Leader Richard Armey recognized Chairman Sensenbrenner for his outstanding oversight efforts with the "Excellence in Programmatic Oversight Award". The award is presented to members who hold federal agencies and programs accountable to American taxpayers.

The Science Committee played a crucial role in numerous issues of national and international significance during Chairman Sensenbrenner's tenure. Acting in accordance with the Committee's jurisdiction over climate change issues, Chairman Sensenbrenner was chosen by the Speaker of the House to lead the U.S. delegation to the Kyoto (Dec. 97), Buenos Aires (Nov. 98), and The Hague (Nov. 2000) global warming conferences. As any agreement would have to be ratified by the Senate and implementing legislation approved by the House, the Science Committee-led delegation provided important oversight of the negotiations and guidance to the House leadership on global warming negotiations. Under Chairman Sensenbrenner's leadership, the Committee examined the science supporting the Kyoto Protocol and the economic harm it could pose to the Nation, as well as the science used to establish the regulatory framework for ozone and air quality strategies.

Much of the world anxiously awaited midnight of January 1, 2000 to see if the Year 2000 (Y2K) computer problem would cause the catastrophe that some had predicted. The Science Committee, through the Subcommittee on Technology, Chaired by Constance Morella (R–MD), held its first hearing on the Y2K problem in 1996 and held or participated in over 30 hearings on the subject. The Committee's aggressive oversight pushed federal agencies to meet their deadlines to ensure the safety and well being of American citizens.

Over many years the Science Committee closely monitored development of the International Space Station, and through its efforts, and those of Chairman Sensenbrenner, forced the Russian government to meet its obligations. In October of 2000, a crew of American and Russian astronauts became the first inhabitants of the space station. Chairman Sensenbrenner's main concern with the space station was to ensure that cost and schedule overruns were minimized. Through nine hearings on the subject, the Chairman worked tirelessly on a bipartisan basis to require the Administration and NASA to develop clear-cut plans to deal with Russian nonperformance and delays.

The Nation was also rocked by charges of espionage at one of the country's premier national laboratories. The Department of Energy

lab at Los Alamos, NM was home to the government's most prized and secret nuclear programs. Once it became apparent that there was significant and credible evidence that nuclear secrets had been stolen, Chairman Sensenbrenner began investigating the implications these security breaches might have on national security and the state of science at our Nation's labs.

The Committee's oversight agenda also played a crucial role in promoting sound science and fiscal responsibility throughout the federal government. Chairman Sensenbrenner initiated an investigation into allegations of intolerance and discrimination at the Environmental Protection Agency and introduced legislation to hold agencies accountable for such actions. Sensenbrenner also shed light on severe cost and schedule overruns at the Department of Energy's National Ignition Facility. This project is expected to take six years longer than planned at an extra cost to the taxpayers of $2 billion. Additionally, Chairman Sensenbrenner fought a proposed tax on the Spallation Neutron Source facility by the State of Tennessee. The Chairman's oversight of this issue saved Federal taxpayer's tens of millions of dollars.

Aggressive oversight is only one part of the picture. During Chairman Sensenbrenner's tenure, funding for civilian federal R&D increased by 39%. Funding for the National Science Foundation increased 23%, including its highest ever appropriation in FY2001. The Science Committee also passed legislation introduced by Chairman Sensenbrenner through the House to authorize nearly $7 billion for information technology (IT) R&D throughout the federal government. Chairman Sensenbrenner also successfully pushed for passage of a NASA authorization bill—the first such authorization since 1992.

Chairman Sensenbrenner made cutting waste, fraud and abuse in federal agencies a top priority. At the same time, funding for Federal R&D steadily increased during his tenure. This combination of fiscal responsibility and a steady, solid investment in Federal R&D served to ensure a solid foundation for the scientific community at the beginning of the new millennium. The Science Committee is justifiably proud of these accomplishments, and as it enters its sixth decade of existence it looks forward to working with our Nation's research and development communities to continue to promote sound science policy.

CHAPTER I—LEGISLATIVE ACTIVITIES OF THE COMMITTEE ON SCIENCE

During the 106th Congress, 94 bills were referred to the Committee on Science; 26 bills were reported or discharged by the Committee; 21 of those measures passed the House; committee interests were conferenced in 4 bills; and 12 measures were enacted.

1.1—P.L. 106–34, FASTENER QUALITY ACT AMENDMENTS ACT OF 1999 (H.R. 1183)

Background and summary of legislation

The purpose of H.R. 1183 is to amend the Fastener Quality Act of 1990 (FQA) to strengthen the protection against the sale of mismarked, misrepresented, and counterfeit fasteners and to eliminate unnecessary requirements, and for other purposes.

H.R. 1183 modifies the Fastener Quality Act of 1990 (FQA) to recognize new quality practices in the fastener industry, focuses on assuring public safety, and imposes the least possible additional burdens on an already regulated industry. To that end, H.R. 1183 fights fraud by clarifying that anyone intentionally misrepresenting the strength or other characteristics of a fastener is subject to the criminal penalties and civil remedies of the Act; ensures accountability by requiring that virtually all fasteners sold in commerce to be marked with the registered trademark of their manufacturer; reduces the burdensome paperwork requirements of the Act by allowing documents to be stored and transmitted in electronic format; and, recognizes industry's growing utilization of improved quality assurance and management systems by allowing fasteners manufactured in accordance with certain quality assurance systems to be deemed in compliance with the requirements of the Act. The automotive, aerospace and heavy equipment manufacturers project the legislation will save over $1 billion annually in unnecessary federal regulations.

Legislative history

On March 25, 1998, the Full Committee marked up H.R. 1183, which was introduced by Chairman Sensenbrenner. The legislation was adopted, as amended, by a voice vote, and ordered reported by a voice vote.

1.2—P.L. 106–65, NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2000 (S. 1059) (SECTIONS 3141–3148, 3150, 3156, 3164, 3174, AND TITLE XXXII OF S. 1059, PUBLIC LAW 106–65)

Background and summary of legislation

On July 1, 1999, the Speaker appointed Science Committee Chairman F. James Sensenbrenner, Jr. (WI–9), Subcommittee on Energy and Environment Chairman Ken Calvert (CA–43), and

Subcommittee on Energy and Environment Ranking Minority Member Jerry F. Costello (IL–12) as additional conferees to S. 1059, the National Defense Authorization Act for Fiscal Year 2000, for consideration of Sections 1049, 3151–53, and 3155–65 of the Senate bill, and Sections 3167, 3170, 3184, 3188–90, and 3191 of the House amendment and modifications committed to conference. These conference committee deliberations, contained in H. Rept. 106–301 (Conference Report to accompany S. 1059), resulted in the enactment of Sections 1062, 3141–3148, 3150, 3156, 3164, 3174, and Title XXXII of the National Defense Authorization Act for Fiscal Year 2000 (Public Law 106–65), which was signed into law by the President on October 5, 1999. Descriptions of these provisions follow.

Section 1062—Assessment of electromagnetic spectrum reallocation

The Senate bill contained a provision (Section 1049) that would require that any system licensed to operate on portions of the frequency spectrum currently used by the Department of Defense (DOD) be designed in such a way as to ensure that it neither interferes with, nor receives interference from, the military systems of the DOD that are operating in those bands. The provision would further require that any costs associated with the redesign of military systems for the purpose of moving them from a frequency for use by another system, public or private, be paid by the entity whose system or systems are displacing the military system.

The House amendment contained no similar provision.

The House receded with an amendment that authorizes the surrender of frequencies where DOD currently has the primary assignment, only if the Secretary of Defense, the Chairman of the Joint Chiefs of Staff, and the Secretary of Commerce, jointly certify to Congress that the surrender of such portions of the spectrum will not degrade essential military capability. Alternative frequencies, with the necessary comparable technical characteristics, would have to be identified and made available to the DOD, if necessary, to restore the essential military capability that will be lost as a result of the surrender of the original spectrum. Essential military capability is that capability provided by the use or planned use of that portion of the spectrum, as of the date of the proposed allocation. In addition, the provision would require that 8 MHz that were identified for auction in the Balanced Budget Act of 1997 be reassigned to the Federal Government for primary use by the DOD. The conferees urge the Secretary of Defense to share such frequencies with state and local government public safety radio services, to the extent that such sharing will not result in harmful interference between the DOD systems and the public safety systems proposed for operation on those frequencies. This provision does not otherwise change the requirement for the Federal Communications Commission to auction the remaining frequencies that were identified for reallocation pursuant to the Omnibus Budget Reconciliation Act of 1993 or the Balanced Budget Act of 1997.

The provision further provides for an interagency review, assessment and report to Congress and the President on the progress made in implementation of national spectrum planning, the re-

allocation of Federal Government spectrum to non-Federal use, and the implications of such reallocations to the affected Federal agencies, which would include the effects of the reallocation on critical military and intelligence capabilities, civil space programs, and other Federal Government systems used to protect public safety.

TITLE XXXI—DEPARTMENT OF ENERGY NATIONAL SECURITY PROGRAMS

Subtitle D—Matters Relating to Safeguards, Security, and Counterintelligence

Section 3141—Short title

The Senate bill contained a provision (Section 3151) that would cite the title of subtitle D as "Safeguards, Security, and Counterintelligence at Department of Energy Facilities." The House amendment contained a provision (Section 3181) that would cite the title of subtitle F as "The National Security Information Protection Improvement Act."

The House receded.

Section 3142—Commission on Safeguards, Security, and Counterintelligence at Department of Energy facilities

The Senate bill included a provision (Section 3152) that would repeal Sections 3161 and 3162(b) of the National Defense Authorization Act for Fiscal Year 1998 (Public Law 105–85), to eliminate the requirement for the Department of Energy (DOE) Security Management Board. The provision creates a permanent, independent Commission on Safeguards, Security, and Counterintelligence at DOE Facilities to assess the adequacy of safeguards, security, and counterintelligence at such facilities. The provision requires the Commission to assess specifically the adequacy of: (1) safeguards, security, and counterintelligence programs, plans, and budgets of each DOE headquarters program element and each DOE field office; (2) capabilities and skills within DOE Headquarters and field organizations; and (3) all relevant DOE guidance, including DOE Orders, Presidential Decision Directives, and the Design Threat Basis document. The provision requires the Commission to make recommendations regarding any changes in security or counterintelligence policies and procedures necessary to balance risk and capability in order to deter or react to credible threats.

The provision requires the Commission to be composed of nine members serving four-year, staggered terms. The provision further requires that appointments be made not later than 60 days after enactment of the provision, as follows: two by the Chairman of the Committee on Armed Services of the Senate, in consultation with the ranking member of that Committee; one by the ranking member of the Committee on Armed Services of the Senate, in consultation with the Chairman of that Committee; two by the Chairman of the Committee on Armed Services of the House of Representatives, in consultation with the ranking member of that Committee; one by the ranking member of the Committee on Armed Services of the House of Representatives, in consultation with the Chairman of that Committee; one by the Secretary of Defense; one by the

DCI; and one by the Director of the Federal Bureau of Investigation (FBI). The provision also requires that: (1) the chairman of the Commission be designated from among the members of the Commission by the Chairman of the Committee on Armed Services of the Senate, in consultation with the Chairman of the Committee on Armed Services of the House of Representatives; (2) the Commission submit to the congressional defense committees, not later than February 15 of each year, an annual activities, findings, and recommendations report; and (3) the report include any recommendations for legislative and administrative action.

The House amendment contained no similar provision, and the House receded.

The conferees recommended that of the funds authorized to be appropriated in Fiscal Year 2000 by Sections 3101 and 3103, not more than $1.0 million be available to the Commission.

Section 3143—Background investigations of certain personnel at Department of Energy facilities

The Senate bill contained a provision (Section 3153) that would require the conduct of a full background investigation, meeting the requirements of Section 145 of the Atomic Energy Act of 1954 of any DOE employee or any DOE contractor employee whose duties or assignments are required to be carried out in physical proximity to locations where Restricted Data or Formerly Restricted Data may be located or who has regular access to locations where Restricted Data is located. The provision would require the Secretary to meet requirements of this provision one year from the date of enactment of this provision. The House amendment contained no similar provision.

The House receded with an amendment that limits such requirements to DOE and DOE contractor employees who work at a nuclear weapons laboratory or a nuclear weapons production facility.

The conferees understood that this requirement will result in increased costs to the DOE. In order to address this need, the conferees recommended an increase to the budget request for security investigations, as discussed elsewhere in this Act.

Section 3144—Conduct of security clearances

The Senate bill contained a provision (Section 3163) that would require that any background investigation on an individual seeking a security clearance for access to Restricted Data be conducted by the FBI. The provision would require the Director of the FBI to comply with this requirement within one year. The provision would further require the Director to submit to the congressional defense committees, the Select Committee on Intelligence of the Senate, and the Permanent Select Committee on Intelligence of the House of Representatives a report on the implementation of this provision, not later than six months after the date of enactment of this Act.

The House amendment contained no similar provision, and the House receded with an amendment that limits the requirement to those DOE employees and DOE contractor employees who work in a program designated by the Secretary of Energy as special access or personnel assurance and accountability programs. The provision requires the Director, within 18 months of the date of enactment

of this Act, to comply with this requirement. The provision also modifies the report requirement by requiring an assessment of the capability of the FBI to carry out this provision, an estimate of the additional resources that would be required, and the extent that contractor personnel would be utilized.

Section 3145—Protection of classified information during laboratory-to-laboratory exchanges

The Senate bill contained a provision (Section 3164) that would require the Secretary of Energy to ensure that all DOE employees and DOE contractor employees who participate in laboratory-to-laboratory cooperative activities are fully trained in matters related to the protection of classified information and potential espionage and counterintelligence threats. The provision would further authorize the Secretary to create a pool of counterintelligence experts to be available to accompany DOE-sponsored delegations overseas with the purpose of identifying and mitigating potential espionage threats.

The House amendment contained no similar provision, and the House receded.

Section 3146—Restrictions on access to national laboratories by foreign visitors from sensitive countries

The Senate bill contained a provision (Section 3156) that would prohibit the obligation or expenditure of any funds authorized to be appropriated or otherwise made available to the DOE by Section 3101 or 3103 of the Senate bill for conducting a cooperative program (including studies and planning) with the People's Republic of China, Nations of the Former Soviet Union, or any nation designated as a sensitive nation by the Secretary of State beginning on the date that is 45 days after the date of enactment of this provision and continuing until 30 days after the date on which the Secretary of Energy, the DCI, and the Director of the FBI individually submit a certification that such programs: (1) are compliant with DOE orders, regulations, and policies relating to counterintelligence, safeguards and security, and personnel assurance program matters; (2) are compliant with Presidential Decision Directives and other regulations relating to counterintelligence and safeguards and security matters; (3) include adequate protections against inadvertent release of Restricted Data, National Security Information, or any other information that might harm the interests of the United States; and (4) do not represent an undue risk to the national security interests of the United States. The provision would require that the certification be provided to the congressional defense committees, the Select Committee on Intelligence of the Senate, and the Permanent Select Committee on Intelligence of the House of Representatives. The prohibition would not apply to ongoing activities carried out under title III of this Act relating to cooperative threat reduction with states of the former Soviet Union or to programs carried out pursuant to a provision noted elsewhere in this Act for the materials protection control and accounting program of the DOE, but would apply to the Nuclear Cities Initiative and Initiatives for Proliferation Prevention.

The House amendment contained a similar provision (Section 3190) that would require the Secretary of Energy to complete a background review on any individual who is a citizen or agent of a nation designated by the Secretary as sensitive before such an individual would be permitted access to a DOE national laboratory. The provision would prohibit any individual who is a citizen or agent of a nation designated as sensitive by the Secretary from entering a DOE national laboratory, beginning 30 days after the date of enactment of this Section and continuing until 45 days after the date that the DOE Director of Counterintelligence, with the concurrence of the Director of the FBI, certifies that all appropriate measures are in place to prevent espionage or intelligence gathering activities by a sensitive nation. The provision would authorize the Secretary to waive the prohibition on any individual if the Secretary determines it is in the national security interests of the United States. The prohibition would not apply to any individual who is an employee or assignee as of the date of enactment of this provision, who has undergone a background review as required by this provision, or who is the representative of a nation that has entered into an agreement with the United States and the admittance of that nation to the DOE laboratory is deemed by the Secretary to be in the interests of the United States.

The Senate receded with an amendment that requires the Secretary to complete a background review on any individual who is a citizen or agent of a nation designated by the Secretary as sensitive before such an individual would be permitted access to a facility of a DOE national laboratory other than areas where access is provided to the general public. The amendment prohibits any individual who is a citizen or agent of a nation designated as sensitive by the Secretary from entering a DOE national laboratory other than areas accessible to the general public, beginning 30 days after the date of enactment of this Section and continuing until 45 days after the date that the DOE Director of Counterintelligence, the Director of the FBI, and the DCI individually submits a certification that the foreign visitors program at the national laboratories: (1) includes all appropriate measures to prevent espionage or intelligence gathering activities by a sensitive nation; (2) are compliant with DOE orders, regulations, and policies relating to counterintelligence, safeguards and security, and personnel assurance program matters; (3) are compliant with Presidential Decision Directives and other regulations relating to counterintelligence and safeguards and security matters; (4) include adequate protections against inadvertent release of Restricted Data, National Security Information, or any other information that might harm the interests of the United States; and (5) do not represent an undue risk to the national security interests of the United States. The provision also authorizes the Secretary to waive the prohibition on any individual or delegation if the Secretary determines it is in the national security interests of the United States to grant the waiver. The prohibition does not apply to any individual who is an employee or assignee of the DOE or a DOE contractor as of the date of enactment of this provision and who has undergone a background review as required by this provision. In addition, the provision exempts from the moratorium activities relating to the Cooper-

ative Threat Reduction Program or Materials Protection Control and Accounting Program.

Section 3147—Department of Energy regulations relating to the safeguarding and security of restricted data

The Senate bill contained a provision (Section 3155) that would amend the Atomic Energy Act of 1954 (42 U.S.C. 2282a) by inserting a new Section that would authorize the assessment of civil penalties of not more than $100,000 per incidence for any person who violates an applicable DOE rule, regulation, or order related to safeguarding or securing Restricted Data. The provision would further authorize the Secretary of Energy to assess monetary penalties against DOE contractors for any violation of a law, regulation, or DOE Order relating to the protection of Restricted Data or Formerly Restricted Data.

The House amendment contained a similar provision (Section 3167) that would authorize identical penalties, but would eliminate an exemption in current law which would otherwise have prohibited assessing such penalties against certain non-profit contractors conducting work on behalf of the DOE.

The Senate receded with an amendment that limits the amount of any penalties that could be levied against the non-profit contractors to not more than the total fee earned by such contractors in a given fiscal year. The amendment would not allow the assessment of any penalties against such non-profit contractors until they entered into a new contractual agreement with the DOE.

The conferees were concerned that lax management by both the DOE and its management and operating contractors has led to increased risks to U.S. national security. The conferees did not view this action as a precedent for any future actions or discussion that may occur in the coming deliberations on extension of the Price-Anderson Act. The conferees believed that protection of classified information and materials is wholly within the control of such contractors and that all DOE contractors, including non-profit entities, should be accountable in this area.

Section 3148—Increased penalties for misuse of restricted data

The Senate bill contained a provision (Section 3157) that would modify the Atomic Energy Act of 1954 (42 U.S.C. 2274) by doubling the penalties for release or misuse of Restricted Data.

The House amendment contained a similar provision (Section 3189) that would increase by twenty times the penalties for release of Restricted Data.

The Senate receded with an amendment that would increase by five times the penalties for release of Restricted Data.

Section 3150—Notice to congressional committees of certain security and counterintelligence failures within nuclear energy defense programs

The Senate bill contained a provision (Section 3162) that would require the Secretary of Energy, after consultation with the DCI and the Director of the FBI, to notify the congressional defense committees of each serious security or counterintelligence failure at a DOE facility that the Secretary considers likely to cause signifi-

cant harm or damage to the national security interests of the United States. The provision would require the Secretary to submit such notice not later than 30 days after learning of the failure. The provision would also require the Senate and the House of Representatives to establish procedures to protect any classified or law enforcement information included in such notice.

The House amendment contained a similar provision (Section 3166) that would require the Secretary of Energy to notify the Armed Services Committees of the Senate and the House of Representatives whenever the Secretary has any knowledge that classified information relating to military applications of nuclear energy has been disclosed in an unauthorized manner to a foreign power or an agent of a foreign power.

The House receded with an amendment that requires the Secretary, after consultation with the Director of CIA and the Director of the FBI, to notify the Armed Services Committees of the Senate and the House of Representatives of each security or counterintelligence failure or compromise of classified information at a DOE facility or a facility operated by a DOE contractor that the Secretary considers likely to cause significant harm or damage to the national security interests of the United States. The provision requires the Secretary to submit such notice not later than 30 days after learning of the failure. The provision also requires the Senate and the House of Representatives to establish procedures to protect any classified or law enforcement information included in such notice.

The conferees noted that the Armed Services Committees of the Senate and the House of Representatives are the committees of Congress with primary oversight of atomic energy defense activities of the DOE. As such, the conferees believed it is necessary that the two committees be kept fully informed of any counterintelligence or security failure or a serious compromise of classified information to a foreign power, either through espionage or through willful or accidental release by a U.S. citizen. This information is essential in order that the committees can effectively carry out appropriate oversight activities and determine if such a disclosure of classified information caused significant damage to U.S. national security interests. The conferees further noted that nothing in this provision shall be construed to modify or supercede any other requirement to report on intelligence-related issues to the Select Committee on Intelligence of the Senate and the Permanent Select Committee on Intelligence of the House or Representatives.

Section 3156—Definition of restricted data

The Senate bill contained a provision (Section 3165) that would define Restricted Data for the purposes of subtitle D of the Senate bill. The House amendment contained no similar provision, and the House receded.

Subtitle E—Matters Relating to Personnel

Section 3164—Whistleblower Protection Program

The Senate bill included a provision (Section 3160) that would require the Secretary of Energy to establish a whistleblower protec-

tion program to ensure that no DOE employee or DOE contractor employee may be discharged, demoted, or otherwise discriminated against as a reprisal for disclosing information relating to the protection of classified information which the employee reasonably believes to provide direct and specific evidence of a violation of any Federal law, gross mismanagement, a gross waste of funds, abuse of authority, or a false statement to Congress on a material fact. The provision would protect such disclosures of information only if they are made to a Federal entity designated by the Secretary of Energy to receive such information, the FBI, the Inspector General of the DOE, or a member of a committee of Congress having primary responsibility for oversight of the department, agency, element of the Federal Government to which the information relates, an employee of a committee of Congress having primary responsibility for oversight of the department, agency, or element of the Federal Government to which the information relates and who holds an appropriate security clearance for access to the information.

The House amendment contained no similar provision.

The House receded with an amendment that requires the Secretary of Energy, acting through the Inspector General, to provide assistance and guidance to each protected individual who seeks to make a protected disclosure under this Section to include: (1) identifying the persons or entities to which a disclosure may be made; (2) advising individuals on the steps to be taken to protect the security of the information to be disclosed; (3) taking appropriate actions to protect the identity of that individual throughout that disclosure; and (4) taking appropriate actions to coordinate that disclosure with any other Federal agency or agencies in which the information originated. The provision also requires the Secretary to notify individuals of their rights under this Section.

The provision further requires the DOE Office of Hearings and Appeals to review any complaint submitted by a DOE employee or DOE contractor employee who alleges that the employee has been discharged, demoted, or otherwise discriminated against as a reprisal for disclosing information relating to the protection of classified information which the employee reasonably believes to provide direct and specific evidence of a violation of any Federal law, gross mismanagement, a gross waste of funds, abuse of authority, or a false statement to Congress on a material fact. The provision requires that the information must have been disclosed pursuant to procedures established by the DOE Inspector General to protect the security of the information to be disclosed. The Office of Hearings and Appeals would be required to investigate all such complaints that are determined to be not frivolous. The provision also requires the Office of Hearings and Appeals to provide an annual report on all such investigations and a summary of the results of such investigations to the congressional defense committees. In addition, the provision requires the Secretary to take remedial action when appropriate, and it requires the Secretary to submit a report to the congressional defense committees describing how the program would be implemented.

Subtitle F—Other Matters

Section 3174—Sense of Congress regarding technology transfer coordination for Department of Energy national laboratories

The House amendment contained a provision (Section 3170) that would require the Secretary of Energy to ensure for the Sandia National Laboratories, Los Alamos National Laboratory, and Lawrence Livermore National Laboratory that: (1) technology transfer policies in patenting, licensing, and commercialization are consistent with other DOE sites; (2) the contractor operating the laboratory make available to aggrieved private-sector entities expedited alternative dispute resolution procedures, including binding and non-binding procedures, to resolve commercialization, license, or patent disputes where the contractor is alleged to be at fault; (3) the alternative dispute resolution procedure to be utilized in any disputes be chosen jointly by the Secretary, the site contractor, and the aggrieved party; (4) the contractor submit an annual report to the Secretary regarding technology transfer successes, current technology transfer disputes involving the laboratory, and progress toward resolving such disputes; and (5) training of laboratory personnel responsible for patenting, licensing, and commercialization activities is adequate to ensure such employees are knowledgeable of appropriate legal, procedural, and ethical standards.

The Senate bill contained no similar provision.

The Senate receded with an amendment that expresses a sense of Congress that technology transfer policies in patenting, licensing, and commercialization at DOE national laboratories should be consistent and that training of laboratory personnel responsible for patenting, licensing, and commercialization activities be adequate to ensure such employees are knowledgeable of appropriate legal, procedural, and ethical standards.

TITLE XXXII—NATIONAL NUCLEAR SECURITY ADMINISTRATION

The House amendment contained a provision (Section 3165) that would require the Secretary of Energy to assign to the Assistant Secretary of Energy for Defense Programs direct authority over, and responsibility for, the nuclear weapons production facilities and national laboratories with respect to strategic management, policy development and guidance, budget guidance and formulation, resource requirements determinations and allocations, administration of contracts, environmental safety and health operations, integrated safety and management, safeguard and security operations, and relations with government agencies. The provision would also establish that certain nuclear weapons production facilities, national laboratories, and operations offices report directly to the Assistant Secretary for Defense Programs. The provision would further allow the Assistant Secretary to delegate to such operations offices a number of support functions, including operational activities, program execution, personnel, contracting and procurement, facility operations oversight, and integration of production and research activities.

The Senate bill contained no similar provision.

The Senate receded with an amendment that would substantially reorganize the national security programs of the DOE.

The conferees noted that the Select Committee on U.S. National Security and Military/Commercial Concerns with the People's Republic of China (known as the Cox Committee) concluded that Chinese espionage efforts had successfully gathered sensitive information related to U.S. nuclear weapons designs. The conferees further noted that the President's Foreign Intelligence Advisory Board (PFIAB), chaired by former Senator Warren Rudman, after reviewing the security failures at DOE, concluded that the root causes of the counterintelligence failures pertained to poor organization and a failure of accountability. The PFIAB noted that many previous efforts to improve organization and accountability at DOE had failed, and concluded that ". . . the Department of Energy is a dysfunctional bureaucracy that has proven incapable of reforming itself."

To correct these systemic problems, the conferees agreed to establish the National Nuclear Security Administration (NNSA), a semi-autonomous agency within the DOE that would be responsible for nuclear weapons development, naval nuclear propulsion, defense nuclear nonproliferation, and fissile material disposition; establish security, counterintelligence, and intelligence offices; and prescribe personnel, budgeting, and other management practices for the NNSA.

Section 3201—Short title

Section 3201 provides that this title may be cited as the "National Nuclear Security Administration Act".

Section 3202—Under Secretary for Nuclear Security of Department of Energy

Section 3202 amends the DOE Organization Act (42 U.S.C. 7132) to establish in the DOE an Under Secretary for Nuclear Security appointed by the President with the advice and consent of the Senate. The Under Secretary—who is to have an extensive background in national security, organizational management, and appropriate technical fields; and be well qualified to manage the nuclear weapons, nonproliferation, and materials disposition programs of the NNSA in a manner that advances and protects the U.S. national security—serves as the Administrator for Nuclear Security under the NNSA Act. As Administrator, the Under Secretary is subject to the authority, direction, and control of the Secretary of Energy. Such authority, direction, and control can only be delegated to the Deputy Secretary of Energy.

Section 3203—Establishment of policy for National Nuclear Security Administration

Section 3203 provides that the Secretary of Energy, acting through the Under Secretary of Nuclear Security, shall be responsible for establishing policy for the NNSA. The Secretary may direct DOE officials who are not within the NNSA to review programs and activities of the Administration and to make recommendations to the Secretary regarding administration of those programs.

Section 3204—Organization of Department of Energy counter-intelligence and intelligence programs and activities

Section 3204 amends the DOE Organization Act (42 U.S.C. 7101) to specify that the Secretary of Energy shall be responsible for developing, and promulgating the security, counterintelligence, and intelligence policies of the DOE. This provision also establishes the DOE Offices of Counterintelligence and Intelligence.

The Director of the DOE Office of Counterintelligence is to be a member of the Senior Executive Service and is responsible for establishing policy for counterintelligence programs and activities at DOE facilities in order to reduce the threat of disclosure of classified and other sensitive information at the facilities. The provision also requires the Director of the Office of Counterintelligence to report on the status and the effectiveness of the counterintelligence programs at facilities of the DOE during the preceding year. In addition, the Director of each DOE National Laboratory must certify in writing to the Director of the Office of Counterintelligence whether that Laboratory is in full compliance with all DOE security requirements and, if not, what measures are being taken to bring that Laboratory into compliance and a schedule for implementing those measures.

The Director of the DOE Office of Intelligence is to be a member of the Senior Executive Service and is responsible for the programs and activities of the DOE relating to the analysis of intelligence with respect to nuclear weapons and materials and energy security.

Subtitle A—Establishment and Organization

Section 3211—Establishment and mission

Section 3211 establishes within the DOE a separately organized agency known as the National Nuclear Security Administration (NNSA). The NNSA's mission is to: (1) Enhance U.S. national security through the military application of nuclear energy; (2) maintain and enhance the safety, reliability, and performance of the U.S. nuclear weapons stockpile, including the ability to design, produce, and test, in order to meet national security requirements; (3) provide the U.S. Navy with safe, militarily effective nuclear propulsion plants and to ensure the safe and reliable operation of those plants; (4) promote international nuclear safety and nonproliferation; (5) reduce global danger from weapons of mass destruction; and (6) support U.S. leadership in science and technology.

This provision also requires that the Administrator ensure that all operations and activities of the Administration are consistent with the principles of environmental protection and the safety and health of the public and the Administration's workforce.

Section 3212—Administrator for Nuclear Security

Section 3212 establishes the Under Secretary for Nuclear Security as the Administrator for the NNSA. The Administrator has authority over and is responsible for all programs and activities of the Administration, except for the functions of the Office of Naval Reactors as specified in Executive Order 12344, including the following: (1) Strategic management; (2) policy development and guid-

ance; (3) budget formulation, guidance, and execution, and other financial matters; (4) resource requirements determination and allocation; (5) program management and direction; (6) safeguards and security; (7) emergency management; (8) integrated safety management; (9) environment, safety, and health operations; (10) administration of contracts, including the management and operations of the nuclear weapons production facilities and the national security laboratories; (11) intelligence; (12) counterintelligence; (13) personnel, including the selection, appointment, distribution, supervision, establishing of compensation, and separation of personnel in accordance with subtitle C of this title; (14) procurement of services of experts and consultants in accordance with Section 3109 of title 5, U.S. Code; (15) legal matters; (16) legislative affairs; (17) public affairs; and (18) liaison with other elements of the DOE and with other Federal agencies, State, tribal, and local governments, and the public. The Administrator may establish Administration-specific policies, unless disapproved by the Secretary.

Section 3213—Status of administration and contractor personnel within the Department of Energy

Section 3213 makes each officer or employee of the Administration, in carrying out the functions of the Administration, subject to the authority, direction, and control of the Administrator, the Secretary of Energy acting through the Administrator, or the Administrator's designee within the Administration. Officers or employees of the Administration are not responsible to, or subject to the authority, direction, or control of any other officer, agent, or employee of the DOE. The provision also stipulates that each officer or employee of a contractor of the Administration is not responsible to, or subject to the authority, direction, or control of any other officer, agent, or employee of the DOE who is not an employee of the Administration, with the exception of the Secretary or Deputy Secretary of Energy.

Section 3214—Deputy Administrator for Defense Programs

Section 3214 establishes the position of Deputy Administrator for Defense Programs within the NNSA, subject to appointment by the President with the advice and consent of the Senate. The provision makes the Deputy Administrator responsible for maintaining and enhancing the safety, reliability, and performance of the U.S. nuclear weapons stockpile. The head of each national security laboratory and nuclear weapons production facility must report to the Deputy Administrator for Defense Programs, consistent with applicable contractual obligations.

Section 3215—Deputy Administrator for Defense Nuclear Nonproliferation

Section 3215 establishes the position of Deputy Administrator for Defense Nuclear Nonproliferation within the NNSA subject to appointment by the President with the advice and consent of the Senate. The provision makes the Deputy Administrator responsible for preventing the spread of materials, technology, and expertise relating to weapons of mass destruction; and for eliminating inventories of surplus fissile material.

Section 3216—Deputy Administrator for Naval Reactors

Section 3216 establishes the position of Deputy Administrator for Naval Reactors. The director of the Naval Nuclear Propulsion Program, provided for under the Naval Nuclear Propulsion Executive Order, shall serve as the Deputy Administrator for Naval Reactors. The provision assigns to the Deputy Administrator the responsibilities, authorities, and accountability for all functions of the Office of Naval Reactors.

Section 3217—General Counsel

Section 3217 establishes a General Counsel for the Administration.

Section 3218—Staff of Administration

Section 3218 requires the Administrator to maintain within the Administration sufficient staff to assist him or her in carrying out the duties of that position. The Administrator is to assign to the staff responsibility for the functions of personnel, legislative affairs, public affairs, and liaison with other elements of the DOE, other Federal agencies, and the public.

Subtitle B—Matters Relating to Security

Section 3231—Protection of national security information

Section 3231 requires the Administrator, subject to the approval of the Secretary of Energy, to establish policies and procedures to ensure maximum protection to classified information in the possession of the Administration. The Administrator must establish procedures requiring personnel of the Administration to report to the Administrator on significant violations of law or executive order relating to the management of classified information.

Section 3232—Office of Defense Nuclear Counterintelligence and an Office of Defense Nuclear Security

Section 3232 establishes an Office of Defense Nuclear Counterintelligence and an Office of Defense Nuclear Security within the NNSA. The Offices is to be headed by a Chief of Defense Nuclear Counterintelligence and a Chief of Defense Nuclear Security.

The Chief of Defense Nuclear Counterintelligence is to report to the Administrator and is to implement counterintelligence policies directed by the Secretary and the Administrator. This Chief is to develop programs for the Administration to prevent the disclosure of classified or sensitive information, and is to develop and administer personnel assurance programs within the Administration.

The Chief of Defense Nuclear Security reports to the Administrator and implements security policies directed by the Secretary and the Administrator. This Chief is responsible for the development and implementation of security programs for the Administration including the protection, control, and accounting of nuclear materials and the physical security and cybersecurity for all facilities of the Administration.

Section 3233—Counterintelligence programs

Section 3233 requires the Administrator to establish and maintain a counterintelligence program at each laboratory or production facility. The Administrator is required to assign an employee of the Office of Defense Nuclear Counterintelligence to each facility at which Restricted Data is located, other than a laboratory or a production facility. This employee is to assess counterintelligence and security matters at the facility.

Section 3234—Procedures relating to access by individuals to classified areas and information of Administration

Section 3234 requires the Administrator to establish procedures to ensure that individuals are not permitted unescorted access to any classified area, or access to classified information, of the Administration until security clearances are verified.

Section 3235—Government access to information of Administration computers

Section 3235 requires the Administrator to establish procedures to govern access to all information on Administration computers. These procedures provide that any individual who has access to information on an Administration computer be required, as a condition of such access, to provide to the Administrator written consent permitting access by an authorized investigative agency to any Administration computer. In addition, the provision stipulates that, notwithstanding any other provision of law, no user of an Administration computer shall have any expectation of privacy in the use of that computer.

Section 3236—Congressional oversight of special access programs

Section 3236 requires the Administrator to submit an annual report to the House and Senate Committees on Armed Services and to the House and Senate Committees on Appropriations on the Administration's special access programs. Each annual report shall contain budgetary information for special access programs and a brief discussion of each program. This provision also required an annual report on the new special access programs with a justification for designating the program as special access, and an identification of existing programs or technologies that are similar to the subject of the new special access program. A new special access program is not allowed to begin until 30 days after House and Senate Committees on Armed Services have been notified that a new special access program is about to be initiated. The provision also requires a report to the House and Senate Committees on Armed Services and to the House and Senate Committees on Appropriations 14 days before any special access program is declassified.

Subtitle C—Matters Relating to Personnel

Section 3241—Authority to establish certain scientific, engineering, and technical positions

Section 3241 provides the NNSA Administrator authority to establish up to 300 scientific, engineering, and technical positions,

hire qualified personnel to fill those positions, and set appropriate compensation levels.

Section 3242—Voluntary early retirement authority

Section 3242 provides the Secretary of Energy temporary authority to offer voluntary early retirement to not more than 600 DOE employees affected by the establishment of the NNSA.

Section 3243—Severance pay

Section 3243 provides the Secretary of Energy authority to pay severance pay in one lump sum to those DOE employees entitled to severance pay as a result of the establishment of the NNSA.

Section 3244—Combined coverage of health care benefits

Section 3244 provides the Secretary of Energy authority to continue to pay the government's share of health insurance premiums to those DOE employees who are involuntarily separated as a result of the establishment of the NNSA.

Subtitle D—Budget and Financial Management

Section 3251—Separate treatment on budget

Section 3251 requires the President to submit the NNSA budget separately within the amounts requested for the DOE. The Section also requires that the budget justification materials submitted to Congress in support of the budget be specified in individual program elements.

Section 3252—Planning, programming, and budgeting

Section 3252 requires the Administrator to establish a sound planning, programming, and budgeting process for the activities of the Administration using funds that are available for obligation for a limited number of years.

Section 3253—Future-years nuclear security program

Section 3253 requires the Administrator to submit a future-year nuclear security program containing the estimated expenditures necessary to support the programs, projects, and activities of the Administration for a five-year period and the anticipated workload requirements for each Administration site during the period of the plan. It also requires that the Administrator submit materials detailing how the funds identified for each program element in the weapons activities budget will help ensure the reliability and safety of the nuclear weapons stockpile.

Subtitle E—Miscellaneous Provisions

Section 3261—Environmental protection, safety, and health requirements

Section 3261 requires the Administrator to ensure that Administration operations comply with applicable environmental, safety and health statutes and to develop procedures for meeting such requirements. The provision also provides that the Secretary of En-

ergy continues to have overall authority and oversight responsibility to ensure that such compliance occurs.

Section 3262—Compliance with Federal Acquisition Regulation

Section 3262 requires the Administrator to establish procedures that ensure that Administration activities are operated in full compliance with the Federal Acquisition Regulation.

Section 3263—Sharing of technology with Department of Defense

Section 3263 requires the Administrator, in cooperation with the Secretary of Defense, to establish procedures that allow for the sharing of technology and expertise between the Administration and the Department of Defense.

Section 3264—Use of capabilities of National Security Laboratories by entities outside Administration

Section 3264 requires the Administrator to establish procedures that, consistent with the national security mission of the Administration, make the capabilities of the national security laboratories available to elements of the DOE that are not part of the Administration, other Federal agencies and other entities.

Subtitle F—Definitions

Section 3281—Definitions

Section 3281 defines the terms: (1) ''national security laboratory'' to mean (A) Los Alamos National Laboratory, Los Alamos, New Mexico; (B) Sandia National Laboratories, Albuquerque, New Mexico, and Livermore, California; and (C) Lawrence Livermore National Laboratory, Livermore, California; (2) ''nuclear weapons production facility'' to mean (A) the Kansas City Plant, Kansas City, Missouri; (B) the Pantex Plant, Amarillo, Texas; (C) the Y–12 Plant, Oak Ridge, Tennessee; (D) The tritium operations facilities at the Savannah River Site, Aiken, South Carolina; (E) the Nevada Test Site, Nevada; and (F) any DOE facility that the Secretary of Energy, in consultation with the Administrator and the Congress, determines to be consistent with the Administration's mission; (3) ''classified information'' to mean any information that has been determined pursuant to Executive Order No. 12333 of December 4, 1981 (50 U.S.C. 401 note), Executive Order No. 12958 of April 17, 1995 (50 U.S.C. 435 note), or successor orders, to require protection against unauthorized disclosure and that is so designated; (4) ''Restricted Data'' to have the meaning given such term in Section 11 y. of the Atomic Energy Act of 1954 (42 U.S.C. 2014(y)); and (5) ''congressional defense committees'' to mean—(A) the Committee on Armed Services and the Committee on Appropriations of the Senate; and (B) the Committee on Armed Services and the Committee on Appropriations of the House of Representatives.

Subtitle G—Amendatory Provisions, Transition Provisions, and Effective Dates

Section 3291—Functions transferred

Section 3291 transfers to the Administrator all national security functions and activities performed immediately before the date of the enactment of this Act by the following elements of the DOE: (1) the Office of Defense Programs; (2) The Office of Nonproliferation and National Security; (3) The Office of Fissile Materials Disposition; (4) the nuclear weapons production facilities; (5) the national security laboratories; and (6) the Office of Naval Reactors. The Secretary of Energy may transfer to the Administrator any other facility, mission, or function that the Secretary, in consultation with the Administrator and Congress, determines to be consistent with the mission of the Administration. And the Secretary of Energy is permitted to transfer environmental and waste management activities to other elements of the Department.

Section 3292—Transfer of funds and employees

Section 3292 requires the Secretary of Energy to transfer to the Administration the balance of funding associated with the functions transferred to the Administration, as well as the employees necessary to carry out those functions.

Section 3293—Pay levels

Section 3293 establishes the compensation for the Under Secretary for Nuclear Security at executive level III and establishes the compensation for Deputy Administrators of the Administration at executive level IV.

Section 3294—Conforming amendments

Section 3294 makes conforming changes to the Atomic Energy Act of 1954, the DOE Organization Act, the National Defense Authorization Act for Fiscal Year 1994 (Public Law 103–60), and the National Defense Authorization Act for Fiscal Year 1997 (Public Law 104–201).

Section 3295—Transition provisions

Section 3295 sets dates by which the Administration has to come into compliance with the provisions of title 32 of this Act. The Administrator is required: (1) to comply with the financial and fiscal management principles specified in Section 3252 by October 1, 2000, and to report to the Armed Services Committees of the House and the Senate by January 1, 2000 on a plan to achieve that compliance; (2) to submit the first future year nuclear security program required in Section 3253 with the FY 2001 budget; and (3) to comply with the Federal Acquisition Regulation specified in Section 3263 by October 1, 2000 and report to the House and Senate Armed Services Committees by January 1, 2000 on a plan to achieve that compliance.

Section 3296—Applicability of preexisting laws and regulations

Section 3296 establishes that all provisions of law and regulations in effect immediately before the effective date of title 32 of this Act remain in force unless otherwise specified.

Section 3297—Report containing implementation plan of Secretary of Energy

Section 3297 requires the Secretary to submit to the House and Senate Armed Services Committees a report containing the Secretary's plan for the implementation of the provisions of this title.

Section 3298—Classification in United States Code

Section 3298 establishes a new chapter of title 50 for the provisions of title 32 of this Act.

Section 3299—Effective dates

Section 3299 establishes March 1, 2000 as the effective date of the provisions of title 32, except for Sections 3202, 3204, 3251, 3295, and 3297, which become effective upon the date of enactment of this Act. Furthermore, implementation of this title is to begin immediately upon enactment so as to ensure that the period between enactment of this Act and the effective date of this title shall serve as a transition period to achieve full compliance of the requirements of this title no later than March 1, 2000.

1.3—P.L. 106–82, TO PROVIDE FOR THE CONVEYANCE OF CERTAIN PROPERTY FROM THE UNITED STATES TO STANISLAUS COUNTY, CALIFORNIA (H.R. 356)

Background and summary of legislation

H.R. 356, To provide for the conveyance of certain property from the United States to Stanislaus County, California, was introduced to transfer excess federal property at the NASA Ames Research Center (CA) to the county government of Stanislaus County. The bill transferred approximately 1528 acres of the Crows Landing facility to the county for county purposes, while maintaining federal responsibility for addressing any environmental cleanup necessitated by prior federal activities. NASA further retains the right to use the property for aviation purposes.

Legislative history

The bill was introduced on January 19, 1999 by Representative Gary Condit, whose district includes the aforementioned property. It was referred to the Committee on Science's Subcommittee on Space and Aeronautics the same day. The Subcommittee recommended adoption after a legislative markup on July 29, 1999. The Committee on Science further recommended adoption by the House of Representatives following a legislative markup on September 9, 1999. The House passed the bill under suspension of the rules on October 4, 1999. The Senate adopted the measure by unanimous consent on October 13, 1999 and the President signed the bill into law on October 27, 1999.

1.4—P.L. 106–178, IRAN NONPROLIFERATION ACT OF 2000 (H.R. 1883)

Background and summary of legislation

The Iran Nonproliferation Act was introduced to improve intelligence reporting on Iran's proliferation activities between the Executive and Legislative branches and to reduce the ability of Iran to acquire weapons of mass destruction and ballistic missiles.

Given open testimony from the intelligence community that Iran's efforts to acquire ballistic missiles and weapons of mass destruction are being assisted by elements of the Russian aerospace industry, Section 6 of the bill prohibits NASA from purchasing any goods and services from the Russian Aviation and Space Agency until the President certifies that: It is the policy of the Russian government to prevent illicit technology transfer to Iran; that the Russian government is taking active measures to prevent such transfers; and that the Russian Aviation and Space Agency and all entities under its jurisdiction have not, in the prior year, engaged in any illicit transfers of technology to Iran.

Exceptions are made for emergency situations in which the lives of ISS crewmembers are in imminent danger and for the Service Module.

Legislative history

The bill was principally drafted in the Committee on International Relations with support from the Committee on Science. International Relations Committee Chairman Gilman introduced H.R. 1883 on May 20, 1999 with Chairman Sensenbrenner, Mr. Gejdenson and Mr. Berman as original co-sponsors. Eventually, the bill had 229 co-sponsors from both sides of the aisle.

H.R. 1883 was referred jointly to the Committees on International Relations and the Science Committee on May 20, 2000. The Committee on International Relations held a markup session and ordered the bill reported, amended, by the Yeas and Nays: 33–0 on September 9, 1999. The Committee on Science referred the bill to the Subcommittee on Space and Aeronautics on June 4, 1999. The subcommittee on Space and Aeronautics held a markup session and forwarded the bill to the Science Committee, amended, by the Yeas and Nays: 19–3 on July 29, 2000. The Science Committee then held a markup session and ordered the bill reported, as amended, to the House on September 9, 1999 by the Yeas and Nays: 41–0. On September 14, 2000 H. Rept. 106–315, Part I was reported to the House and the House passed the bill under suspension of the rules, as amended, by the Yeas and Nays: (2/3 required): 419–0 (Roll No. 409), at which time it was sent to the Senate. On February 24, 2000 the Senate passed the bill with an amendment by a Yea-Nay vote of 98–0 (Record Vote Number: 12). The House agreed to the Senate amendments by the Yeas and Nays: 420–0 (Roll No. 28) on March 1, 2000. The President signed the bill and it became Public Law 106–178 on March 14, 2000.

1.5—P.L. 106–181, WENDELL H. FORD AVIATION INVESTMENT AND REFORM ACT FOR THE 21ST CENTURY (H.R. 1000/H.R. 1551, CIVIL AVIATION RESEARCH AND DEVELOPMENT AUTHORIZATION ACT OF 1999)

Background and summary of legislation

The purpose of H.R. 1551 is to authorize the Federal Aviation Administration to conduct research and development activities for Fiscal Years 2000 and 2001. The projects improve the national airspace system by increasing its safety, security, capacity, and productivity to meet the expected air traffic demands of the future.

H.R. 1551, the Civil Aviation Research and Development Authorization Act of 1999, was introduced by the Chairwoman of the Technology Subcommittee, Ms. Connie Morella, and Ranking Member of the Subcommittee, Mr. James Barcia.

The agency's R&D efforts develop and validate the technology and knowledge required for the FAA to ensure the safety, efficiency, and security of our national air transportation system. Today, the system is under heavy pressure to keep pace with the rising aviation demands of the coming century.

During floor consideration of H.R. 1551, a Manager's Amendment offered by Chairman Sensenbrenner that was crafted in consultation with the Transportation and Infrastructure Committee eliminated certain provisions of H.R. 1551 that were already authorized through the House passage of H.R. 1000, the Aviation Investment and Reform Act for the 21st Century. As amended by the Manager's Amendment, H.R. 1551 authorizes $208 million in FY 2000 and $223 million in FY 2001 for the FAA to conduct research and development in the areas of air traffic management, communications, navigation, weather, aircraft safety, system security, airport technology and human factors. The legislation fully funded the Administration's FY 2000 request and allowed a modest, but necessary increase of three percent over the FY 1999 enacted funding level for the various research and development activities.

Consistent with the Administration's request, H.R. 1551 authorized $16 million in FY 2000 and $30 million in FY 2001 to carry out the Safe Flight 21 operational evaluation project. This support came after the FAA, under pressure from the Science Committee, scaled-back the project's size, achieved industry consensus and support, and provided the Committee with a better accounting of the projects role in achieving the agency's efficiency goals for the 21st Century.

Recognizing that our nation's commercial aircraft fleet continues to age, H.R. 1551 included a provision directing the FAA to expand its current aging aircraft R&D efforts to include non-structural components. Also, H.R. 1551 included important oversight provisions to ensure that our nation's investments in aviation research and development are effectively utilized. For instance, Section 5 of the legislation requires the FAA to work cooperatively with NASA to jointly prepare and transmit to Congress an integrated civil aviation safety R&D plan that clearly defines the roles and responsibilities of the two agencies. Section 4 amends the current law to require the FAA to develop a National Aviation Research Plan in accordance with the Government Performance and Results Act. Finally, H.R. 1551 ensured accountability and public access to award

information by requiring the FAA to post the abstracts related to all R&D grants and awards on the agency's Internet home page.

Many of the provisions of H.R. 1551 were included in P.L. 106–181, the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century. In particular, Title IX of the Act authorizes $224 million in FY 2000, $237 million in FY 2001, and $249 million in FY 2002 for FAA's Research, Engineering and Development projects and activities.

Legislative history

On April 29, 1999, the Full Committee marked up the legislation (H.R. 1551), which was introduced by the Subcommittee Chairwoman, Mrs. Connie Morella. The legislation was adopted, as amended, by a voice vote, and ordered reported, by a voice vote.

On September 15, 1999 The House adopted the amendment in the nature of a substitute as agreed to by the Committee of the Whole House on the state of the Union and passed H.R. 1551 unanimously by a voice vote.

Provisions of H.R. 1551 were incorporated into P.L. 106–181, "The Wendell H. Ford Aviation Investment and Reform Act for the 21st Century."

1.6—P.L. 106–193, METHANE RESEARCH AND DEVELOPMENT ACT OF 2000 (H.R. 1753/S. 330)

Background and summary of legislation

H.R. 1753, the Methane Research and Development Act of 2000, was introduced by Representative Michael F. Doyle (PA–18) on May 11, 1999. The bill was referred to the Committee on Science, and in addition to the Committee on Resources, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned. Within the Science Committee, it was referred to the Subcommittee on Energy and Environment on May 11, and within the Resources Committee, it was referred to the Subcommittee on Energy and Mineral Resources on May 21.

Legislative history

The Science Subcommittee on Energy and Environment marked-up the bill on May 12, 1999, and forwarded it to the Full Science Committee (amended) by voice vote. The Full Science Committee marked-up the bill on September 9 and ordered it to be reported (amended) by Voice Vote. On October 13, 1999, the Science Committee filed H. Rept. 106–377, Part 1.

The Resources Subcommittee on Energy and Mineral Resources held a hearing on H.R. 1753 on May 25, 1999. The Full Resources Committee marked-up the bill on June 30 and ordered it to be reported (amended) by Voice Vote. On October 18, 1999, the Resources Committee filed H. Rept. 106–377, Part 2.

The House passed H.R. 1753 under suspension of the rules on October 26, 1999, by Voice Vote, and the bill was received in the Senate on October 27, 1999. On November 19, the Senate passed the bill with an amendment by Unanimous Consent. On April 3, 2000, the House agreed to the Senate amendment with an amend-

ment pursuant to H. Res. 453, and passed the bill under suspension of the rules by Voice Vote. On April 13, the Senate agreed to the House amendment to the Senate amendments by Unanimous Consent. The President signed H.R. 1753 into law on May 2, 2000 (Public Law 106–193).

As enacted, the legislation directs the Secretary of Energy, acting through the Assistant Secretary for Fossil Energy, to commence a methane hydrate research and development (R&D) program.

Section 3 of the Act authorizes the Secretary to award program grants or contracts (based on a competitive merit-based process), or enter into cooperative agreements with institutions of higher education and industrial enterprises.

Section 3 also directs the Secretary to establish a panel to: (1) provide advice on applications of methane hydrates and priorities for the program; and (2) report to Congress on the impact on global climate change from methane hydrate formation and degassing and the consumption of natural gas produced from such hydrates. It limits to five percent the amount of program funding that can be used for administrative expense and prohibits the use of program funding for building construction, and requires the Secretary, in awarding such grants or contracts or entering into such cooperative agreements, to: (1) facilitate and develop partnerships among government, industry, and institutions of higher education; (2) undertake programs to develop basic information necessary for promoting long-term interest in methane hydrate resources as an energy source; (3) ensure that the data and information developed through the program are accessible and widely disseminated; (4) promote cooperation among agencies that are developing technologies that may hold promise for methane hydrate resource development; and (5) report annually to Congress on accomplishments.

Section 4 amends the Mining and Minerals Policy Act of 1970 to: (1) redefine "marine mineral resource" to include methane hydrate (for the purposes of the marine mineral resources research program); and (2) define "methane hydrate."

Section 5 authorizes appropriations for FY 2002 through 2005: $5.0 million for FY 2001; $7.5 million for FY 2002; $11.0 million for FY 2003; and $12.0 million for each of FY 2004 and FY 2005.

Section 6 sunsets the methane hydrate R&D program after the end of FY 2005, and Section 7 instructs the Secretary to enter into an agreement with the National Research Council for a study and report to Congress on the progress made under the methane hydrate R&D program, together with any recommendations for future methane hydrate R&D needs.

Finally, Section 8 requires the Secretary to provide to the House Committee on Science any report or study prepared at the direction of any congressional committee.

1.7—P.L. 106–224, AGRICULTURAL RISK PROTECTION ACT OF 2000 (H.R. 2559/TITLE I—BIOMASS RESEARCH AND DEVELOPMENT ACT OF 2000 IN S. 935, NATIONAL SUSTAINABLE FUELS AND CHEMICALS ACT OF 1999, AS PASSED BY THE SENATE, BECAME TITLE III OF H.R. 2559)

Background and summary of legislation

The Biomass Research and Development (R&D) Act of 2000, which was signed into law by the President on June 22, 2000, combines features of three separate bills that were referred to the Committee on Science: Title I of S. 935 and H.R. 2827, the National Sustainable Fuels and Chemicals Act of 1999; and H.R. 2819, the Biomass Research and Development Act of 1999.

As enacted, the legislation includes the following provisions.

Section 301 cites Title III as the "Biomass Research and Development Act of 2000" (hereafter, "Act").

Section 302 lists 13 findings, and Section 303 defines ten terms.

Section 304 mandates cooperation and coordination between the Secretary of Agriculture and the Secretary of Energy with respect to policies and procedures that promote R&D leading to the production of biobased industrial products. In order to facilitate this cooperation and coordination, a senior official in each of the U.S. Department of Agriculture (USDA) and DOE is to be designated as a "point of contact." The points of contact are to assist in arranging interlaboratory and site-specific supplemental agreements for research, development, and demonstration projects relating to biobased industrial products; serve as cochairpersons of the Biomass Research and Development Board; administer the Initiative; and respond in writing to each recommendation of the Advisory Committee.

Section 305 requires the Secretaries of Energy and Agriculture to jointly establish the Biomass Research and Development Board to coordinate programs within and among departments and agencies of the Federal Government for the purpose of promoting the use of biobased industrial products. This Board is to supercede the Interagency Council on Biobased Products and Bioenergy established by Executive Order 13134. This section also specifies the Board's membership, duties, funding, and frequency of meetings.

Section 306 establishes the Biomass Research and Development Technical Advisory Committee, which is to supercede the Advisory Committee on Biobased Products and Bioenergy established by Executive Order 13134. This section also specifies the Advisory Committee's membership and appointment process, duties, coordination, frequency of meetings, and terms. With respect to terms, members of the Advisory Committee shall be appointed for a term of 3 years, except that: (1) $\frac{1}{3}$ of the members initially appointed shall be appointed for a term of 1 year; and (2) $\frac{1}{3}$ of the members initially appointed shall be appointed for a term of 2 years.

Section 307 requires the Secretaries of Agriculture and Energy, acting through their respective points of contact and in consultation with the Biomass Research and Development Board, to establish and carry out a Biomass R&D Initiative under which competitively awarded grants, contracts, and other financial assistance are provided to, or entered into with, eligible entities to carry out research, development, and demonstration on biobased industrial

products. Other provisions of Section 307 address the purposes of grants, contracts, and other financial assistance under this section; eligible entities; uses of grants, contract, and assistance; technology and information transfer to agricultural users; and authorization of appropriations. In particular, Section 307(f) authorizes USDA $49.0 million for each of FYs 2000 through 2005, which is in addition to funds appropriated for biomass R&D under the general authority of the Secretary of Energy (and which may also be used to carry out the Act).

Section 308 authorizes the Secretaries of Energy and Agriculture to provide administrative support and funds of DOE and USDA to the Board and the Advisory Committee as are necessary to enable them to carry out this Act. Not more than 4 percent of the amount appropriated for each fiscal year may be used to pay the administrative costs of carrying out this Act.

Section 309 requires that an initial report be jointly submitted to Congress by the Secretaries of Agriculture and Energy within 180 days of enactment of the Act and that an annual report be submitted to Congress for each fiscal year for which funds are made available.

Finally, Section 310 terminates the authority under this Act on December 31, 2005.

1.8—P.L. 106–391, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF FY 2000, FY 2001, AND FY 2002 (H.R. 1654)

Background and summary of legislation

H.R. 1654, the National Aeronautics and Space Administration Act of 2000 authorizes funding for NASA's activities in fiscal years (FY) 2000, 2001, and 2002. H.R. 1654 authorized $13.601 billion for FY 2000, $14.184 billion for FY 2001 and $14.625 billion for FY 2002. The FY 2000 authorization was at the level of the appropriation. The President requested $14.035 billion for NASA in FY 2001 and $14.465 billion for NASA in FY 2002. The bill's highlights are summarized below.

- Provides a $25.0 billion cost cap for International Space Station (ISS) development and a $17.7 billion cost cap for Space Shuttle launch costs in connection with ISS to control cost growth. The cost cap does not apply to operations, research, or crew return activities after ISS completion. An additional contingency fund of $5 billion for ISS and $3.5 billion for Space Shuttle is authorized to provide flexibility in case of an emergency or other unusual circumstance.
- Directs NASA to establish a non-governmental organization (NGO) to manage research and commercial activities on the ISS after it is completed to improve scientific utility of the Space Station.
- Prohibits NASA from spending funds to design, procure, or develop an inflatable space module to replace currently planned and already-built ISS components. Technical, cost, and schedule uncertainties with inflatable technology make it prohibitively risky to substitute into the current ISS design. The provision, however, does not preclude NASA from leasing a commercially developed in-

flatable structure as long as it costs the same or less than the current design, does not cause a schedule delay, or increase safety risks. Includes initiatives encouraging the NASA administrator to seek reduction in Space Station utilization rights for International Partners that willfully violate any of their commitments to the program. Provides for equitable utilization of the ISS in accordance with the ISS Inter-Governmental Agreement (IGA).

• Authorizes a 2.5% increase in funding in FY 2001 and FY 2002 for Science, Aeronautics and Technology, such as Space Science, Life & Microgravity, Earth Science, Aero-Space Technology, and Academic Programs. Increases funding for Life & Microgravity Research: +10.8% in FY 2001 and +14.5% in FY 2002. Authorizes $290 million in FY 2001 and $610 million in FY 2002 for the Second Generation Reusable Launch Vehicle Program. Authorizes $492 million in FY 2001 for Space Shuttle safety and performance upgrades. Also, the bill directs NASA to conduct a study to assess the relative priority of Shuttle upgrades which are under consideration. Directs NASA to conduct a study to assess the readiness of the scientific community to use the Space Station for life and microgravity research.

Legislative history

Congressman Dana Rohrabacher of California introduced H.R. 1654 on May 5, 1999. The bill was cosponsored by Congressman George E. Brown, of California, Congressman Merrill Cook of Utah, Congressman Bob Etheridge of North Carolina, Congressman Gary Miller of California, Congressman George R. Nethercutt, Jr. of Washington, and Congressman Dave Weldon of Florida.

The Committee on Science held a markup session of H.R. 1654 on May 13, 1999 and ordered the legislation reported as amended. The report was filed on May 18, 1999 (H. Rept. 106–145). H.R. 1654 was passed by the House of Representatives on May 19, 1999 by a recorded vote: 259—168 (Roll no. 139). On November 5, 1999 the Senate passed H.R. 1654 with an amendment by unanimous consent. The House and Senate negotiated a compromise of the bill in conference and filed conference report H. Rept. 106–843 on September 12, 2000. The House agreed to the conference report on September 14, 2000 by the Yeas and Nays: 399—17 (Roll no. 475) and the Senate agreed to the conference report by unanimous consent on October 13, 2000. On October 30, 2000 H.R. 1654 was signed by the President and became Public Law 106–391.

1.9—P.L. 106–398, FLOYD D. SPENCE NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2001 (H.R. 4205/H.R. 5408) (SECTIONS 1061–1065, 3161–3165, 3196 AND 3197 OF H.R. 5408)

BACKGROUND AND SUMMARY OF LEGISLATION

On July 27, 2000, the Speaker appointed Science Committee Chairman F. James Sensenbrenner, Jr. (WI–9), Subcommittee on Energy and Environment Chairman Ken Calvert (CA–43), and Subcommittee on Space and Aeronautics Ranking Minority Member Bart Gordon (TN–12) as additional conferees to H.R. 4205, the National Defense Authorization Act for Fiscal Year 2001, for con-

sideration of Sections 1402, 1403, 3161–3167, 3169, and 3176 of the Senate amendment, and modifications committed to conference.

The Speaker also appointed Subcommittee on Technology Chairman Constance A. Morella (MD–8) in lieu of Mr. Calvert for consideration of Sections 1402, 1403, and 3176 of the Senate amendment, and modifications committed to conference. These conference committee deliberations, contained in H. Rept. 106–945 (Enactment of Provisions of H.R. 5408, the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001, Conference Report to accompany H.R. 4205), resulted in the enactment of Sections 1061–1065, 3161–3165, 3196 and 3197 of the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001 (Public Law 106–398), which was signed into law by the President on October 30, 2000. Descriptions of these provisions follow.

TITLE X—GENERAL PROVISIONS

Subtitle G—Government Information Security Reform

Sections 1061–1065 address Government information security reform.

The Senate amendment contained a series of provisions (Sections 1401–1405) that would provide for reform of Federal information security practices.

The House bill contained no similar provision.

The House receded with an amendment that would simplify audit and evaluation requirements and would clarify the roles and responsibilities of the Department of Defense (DOD).

The amendment would establish a new subchapter of title 44, United States Code, addressing the responsibilities of the Office of Management and Budget (OMB) and Federal agencies—including the National Institute of Science and Technology—in the area of information security. This new subchapter would remain in effect for two years after the effective date of the provision. The amendment would provide specific guidance on the responsibilities of certain agencies including the DOD. The amendment would also address the relationship between the defense information assurance program established under section 2224, title 10, United States Code, and the government-wide information security program.

The conferees noted that the conference agreement would provide the DOD authority to implement its own information assurance policy in accordance with the requirements of section 2224, title 10, United States Code. The amendment would require the Director of OMB to delegate policy and oversight authority with regard to national security systems, classified systems, and other critical information systems of the Department of Defense and Intelligence Community to the Secretary of Defense, the Director of Central Intelligence (DCI), and, if designated by the President, an additional agency head. These agencies would be directed to develop their own information security policies, principles, standards, and guidelines. For the DOD, these policies, principles, standards and guidelines would be required to cover the full range of information assurance issues addressed in section 2224 of title 10, United States Code.

TITLE XXXI—DEPARTMENT OF ENERGY NATIONAL SECURITY PROGRAMS

Subtitle E—National Laboratories Partnership Improvement

Section 3161—Technology Infrastructure Pilot Program

The Senate amendment contained a provision (section 3163) that would authorize the Secretary of Energy to obligate up to $10.0 million per year for a three-year period to establish the Technology Infrastructure Pilot Program. The pilot program would promote establishment of technology partnership clusters in the vicinity of certain DOE laboratories and plants. The provision would authorize each such DOE site to expend available funds to carry out cooperative activities with local businesses, universities, research organizations, or state, local, and tribal governments.

The House had no similar provision.

The House receded with an amendment that would authorize the Administrator of the NNSA to obligate up to $5.0 million during fiscal years 2001 and 2002 to carry out the pilot program.

The conferees were concerned that technology partnerships within the Office of Defense Programs have not been well managed in the past nor have they resulted in significant return on investment. Nevertheless, the conferees recognized that public-private collaborations may, if properly focused and managed, result in the development of commercially viable technologies that support the core nuclear weapons and nuclear nonproliferation missions of the NNSA. The Technology Infrastructure Pilot Program will allow the NNSA laboratories and facilities to explore new ways to collaborate with private entities in research, training, and shared facilities to enhance these core NNSA missions. The conferees noted that technology networks of this kind have proven successful in the private sector. The conferees further noted that the provision would not preclude the possibility of subsequent authorizations in appropriate circumstances.

Section 3162—Report on small business participation in National Nuclear Security Administration activities

The Senate amendment contained a provision (Section 3164) that would require each laboratory to establish a small business advocacy and assistance program to increase the participation of small businesses in all contracting aspects at the laboratory. The provision would also require each laboratory to establish a small business assistance program to help local small businesses obtain more subcontracts at the laboratory and improve the commercial value of their products and services.

The House bill contained no similar provision.

The House receded with an amendment that would require the Administrator of the National Nuclear Security Administration (NNSA) to report to the congressional defense committees not later than February 15, 2001, regarding the effectiveness of NNSA small business programs, recommendations on how to improve them, and any legislative changes required to implement such improvements.

Section 3163—Study and report related to improving mission effectiveness, partnerships, and technology transfer at national security laboratories and nuclear weapons production facilities

The Senate amendment contained a provision (Section 3166) that would require the Secretary of Energy to direct the Laboratory Operations Board (LOB) to study and to report on the possible benefits of and need for policies and procedures to facilitate the transfer of scientific, technical and professional personnel among national security laboratories and facilities. The LOB would be required to report on the possible benefits of and need for changes in the following: (1) the indemnification requirements for patents or other intellectual property licensed from a laboratory or facility; (2) the royalty and fee schedules and types of compensation that may be used for patents or other intellectual property licensed to a small business concern from a DOE National Laboratory or facility; (3) the licensing procedures and requirements for patents and other intellectual property, including preferences for small businesses started by former laboratory or facility employees who invented the patented technology or other intellectual property; (4) the infringement and protections available to small businesses that have received patents or other intellectual property from a laboratory or facility; (5) the advance funding requirements for a small business that funds a project at a DOE laboratory or facility through a Funds-In-Agreement; (6) the intellectual property rights allocated to a business that funds a project at a laboratory or facility through a Funds-In-Agreement; and (7) the policies on royalty payments to inventors employed by a contractor-operated DOE laboratory or facility, including those for inventions made under a Funds-In-Agreement.

The LOB would be required to report to the Secretary not later than one year after the date of enactment of this Act. The Secretary would be required to transmit the report to Congress not later than one month after receiving the report of the LOB concurrent with the submission of the report of the Secretary shall provide recommendations regarding appropriate action and legislative proposals.

The House bill contained no similar provision.

The House receded with an amendment that would require the Secretary of Energy Advisory Board to prepare and to submit the report related to the national security laboratories and facilities. The amendment would also require the report to include the advantages and disadvantages of providing the NNSA Administrator with special contracting authority, such as "other transactions" authority.

Section 3165—Definitions

The Senate amendment contained a provision (Section 3162) that would define the terms referenced in subtitle E of this Act.

The House bill contained no similar provision.

The House receded with an amendment that would define the terms "national security laboratory" and "nuclear weapons production facility" as they are defined in section 3281 of the National Nuclear Security Administration Act (Public Law 106–65).

Subtitle G—Other Matters

Section 3196—Cooperative research and development agreements for government-owned, contractor-operated laboratories

The Senate amendment contained a provision (Section 3176) that would amend the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710) to streamline the approval process for cooperative research and development agreements (CRADA) at government-owned, contractor-operated (GOCO) facilities by authorizing Federal agencies to substitute an annual strategic plan for individual joint work statements. The provision would, for a period of five years after the date of enactment of this Act, authorize the waiver of any license retained by the government if the retention of that license would inhibit commercialization of an invention that would otherwise serve an important Federal mission. The provision would further streamline the CRADA process for GOCO facilities by authorizing Federal agencies to permit routine CRADAs to be negotiated and signed by GOCO employees.

The House bill contained no similar provision.

The House receded with an amendment that would limit the applicability of the license waiver provision to the activities of the NNSA laboratories, and would require a report on all license waivers.

Section 3197—Office of Arctic Energy

The Senate amendment contained a provision (Section 3169) that would establish the Office of Arctic Energy Research.

The House bill contained no similar provision.

The House receded with an amendment that would provide the Secretary of Energy with discretionary authority to establish the Office of Arctic Energy Research.

Legislative provisions not adopted

Short Title—The Senate amendment contained a provision (Section 3161) that would cite the subtitle E of the National Defense Authorization Act for Fiscal Year 2001 as the National Laboratories Partnership Improvement Act of 1999.

The House bill contained no similar provision.

The Senate receded.

Technology Partnerships Ombudsman—The Senate amendment contained a provision (Section 3165) that would require each DOE laboratory to establish a technology partnership ombudsman to resolve complaints from outside organizations regarding patents, technology licenses, and other issues.

The House bill contained no similar provision.

The Senate receded.

Other Transactions Authority—The Senate amendment contained a provision (Section 3167) that would authorize the Secretary of Energy to permit the award contracts on a non-competitive basis, commonly known as "other transactions" authority.

The House bill contained no similar provision. The Senate receded.

The conferees noted that a report on "other transactions" authority is required elsewhere in this conference agreement.

1.10—P.L. 106–404, TECHNOLOGY TRANSFER COMMERCIALIZATION ACT OF 2000 (H.R. 209)

Background and summary of legislation

The purpose of H.R. 209 is to promote partnerships with Federal laboratories through the commercialization of government-owned inventions by reforming technology licensing authorities under the Bayh-Dole Act and by permitting laboratories to bring already existing government inventions into a Cooperative Research and Development Agreement (CRADA), among other purposes.

H.R. 209 provides parallel authorities to those currently in place under the Bayh-Dole Act for licensing university or university-operated Federal laboratory inventions. The bill also amends the Stevenson-Wydler Act, as amended, to allow Federal laboratories to include already existing patented inventions into a cooperative research and development agreement (CRADA).

Thus, agencies would be provided with two important new tools for effectively commercializing on-the-shelf Federally owned technologies—either licensing them as stand-alone inventions, under the bill's revised authorities of Section 209 of the Bayh-Dole Act, or including them as part of a larger package under a CRADA.

H.R. 209 also relaxes the public notification requirements removes language that currently results in delays of at least five months before a license can be formally granted. Additionally, the bill simplifies the requirement for the submission of a marketing and business plan for the invention. According to testimony from the Technology Subcommittee hearings, these requirements and its potential to delay the process have been great disincentives for the commercializing of on-the-shelf government inventions.

Legislative history

Congresswoman Constance A. Morella of Maryland introduced H.R. 209 on January 6, 1999 in the 106th Congress. On March 25, 1999, the Science Committee considered H.R. 209. The Committee adopted an en bloc amendment and ordered H.R. 209 reported, as a single amendment in the nature of a substitute, by voice vote.

On October 5, 2000, H.R. 209 was passed by the Senate under unanimous consent with an amendment.

On October 10, 2000, the House approved the legislation sending it to the President to become law.

1.11—P.L. 106–405, COMMERCIAL SPACE TRANSPORTATION COMPETITIVENESS ACT OF 2000 (H.R. 2607)

Background and summary of legislation

H.R. 2607, the Commercial Space Transportation Competitiveness Act of 1999, authorizes funding for the Offices of Advanced Space Transportation and Space Commerce in the Departments of Transportation and Commerce, respectively. Moreover, the bill extends commercial launch indemnification through the end of calendar 2004. It further requires a report from the Secretary of Transportation reviewing alternative liability risk-sharing regimes for the U.S. government and the U.S. space launch industry. The bill has been identified by the private sector as its top priority for

maintaining U.S. competitiveness vis-a-vis launch competition from other countries.

Legislative history

Chairman Rohrabacher introduced the bill on July 26, 1999. The bill acquired 11 co-sponsors, including the ranking minority member of the Subcommittee on Space and Aeronautics and two other Democrats. After referral to the Committee on Science and its Subcommittee on Space and Aeronautics, the Subcommittee marked the legislation up and recommended its adoption on July 29, 1999. On October 4, 1999, the House of Representatives considered the bill under the suspension of rules and passed it.

On October 19, 1999, the bill was referred to the Senate Committee on Commerce, Science, and Transportation. On October 13, 2000, Senator McCain laid a substitute before the Senate for consideration under unanimous consent. Senate Amendment 4321 to H.R. 2607 was adopted by unanimous consent on October 13, 2000 and the bill was referred back the House of Representatives. On October 17, 2000 the bill was considered and adopted by the House of Representatives under a suspension of the rules. The bill was presented to the President on October 20, 2000 and signed into law by him on November 1, 2000.

1.12—P.L. 106–503, TO AUTHORIZE APPROPRIATIONS FOR THE UNITED STATES FIRE ADMINISTRATION, AND FOR CARRYING OUT THE EARTHQUAKE HAZARDS REDUCTION ACT OF 1977, FOR FISCAL YEARS 2001, 2002, AND 2003, AND FOR OTHER PURPOSES (H.R. 1550/H.R. 1184/S. 1639)

Background and summary of legislation

Title I: United States Fire Administration.—Title I authorizes: $44.8 million for Fiscal Year (FY) 2001 ($25 million below the requested level); $47.8 million for FY 2002; and $50.0 million for FY 2003. Of the total authorized over the three years, $9.75 million has been set aside for research, $750,000 for outsourcing of data analysis, and $21.0 million for anti-terrorism training. Title I also requires the Fire Administration to certify that funds obligated in FY 2002 are consistent with the strategic plan required in the bill. In addition to the increased authorizations for research funding, Title I also requires USFA to establish research priorities and to develop a plan for implementing a research agenda.

Title I also directs USFA to: make available to State and local fire and emergency services information on excess federal equipment and on setting up cooperative agreements with federal facilities, such as military bases; conduct an assessment of the need for additional counter-terrorism training for emergency responders; review the content and delivery of the curriculum offered by the National Fire Academy; post abstracts of research grants it awards on its Internet home page, and allows, as in the Senate bill, up to $1.0 million in funds to be used for fire safety research at the Worcester Polytechnic Institute.

In addition, Title I: repeals obsolete references and sections of statute authorizing USFA; repeals a provision in law that exempts federally-funded housing built in New York City from sprinkler re-

quirements; and, in accordance with the amended Senate bill, makes technical changes to the U.S. Code relating to the National Fallen Firefighters Foundation.

Title II: Earthquake Hazards Reduction.—Four agencies participate in NEHRP—the Federal Emergency Management Administration (FEMA), the U.S. Geological Survey (USGS), the National Science Foundation (NSF), and the National Institute of Standards and Technology (NIST). For FY 2001, Title II of H.R. 1550 authorizes the requested level of $104.1 million for base earthquake activities in these agencies, including specific authorizations for USGS for the Global Seismic Network and the Real-Time Seismic Warning System. For each of FYs 2002 and 2003, Title II authorizes increases to the base program of 4.25 percent. For FY 2002, Title II authorizes $108.5 million; for FY 2003, $113.1 million.

In addition, Title II includes multi-year authorizations for two new projects, each of which grew out of congressional direction in the last NEHRP bill and were included in H.R. 1184. The Advanced National Seismic Research and Monitoring System (ANSRMS) will update the Nation's existing seismic monitoring network, which is based on 30-year-old technology. Title II authorizes $170.8 million over FYs 2002 through 2006 for the U.S. Geological Survey for equipment, and a further $14.8 million over two years for the incremental costs of system operation.

The George E. Brown, Jr., Network for Earthquake Engineering Simulation (NEES)—named after the late Ranking Minority Member of the Science Committee—will link more than 30 earthquake engineering research facilities and upgrade and expand major earthquake testing facilities. Title II provides NSF with a four-year authorization (FYs 2001 through 2004) totaling $74.1 million for this program.

Finally, Title II authorizes funding for studying the New Madrid fault and a Scientific Earthquake Studies Advisory Committee at the U.S. Geological Survey, requires greater inter-agency co-ordination in formulating the Program's budget, requests a report on how the Program meets the needs of at-risk populations, and repeals obsolete provisions of the statute.

Legislative history

On October 27, 2000, the House passed H. Res. 655 on a recorded vote of 384 to 5. H. Res. 655 provided technical corrections to H.R. 1550 and S. 1639 as amended by the Senate. The resolution also reflected a compromise between comparable bills in the House (H.R. 1550 and H.R. 1184) and Senate (S. 1639) and incorporated these two bills in Titles I and II, respectively, of H.R. 1550.

On October 31, 2000, the Senate agreed to the House amendment to H.R. 1550. H.R. 1550 was signed into law on November 13, 2000.

U.S. Fire Administration.—The Subcommittee on Basic Research of the Committee on Science held a hearing on March 23, 1999 to hear testimony on the Administration's Fiscal Year 2000 budget request for USFA and to examine issues related to a two-year authorization for the agency.

On April 26, 1999, Mr. Nick Smith (MI), Chairman of the Subcommittee on Basic Research, joined by Ms. Johnson of (TX), Ranking Minority Member of the Subcommittee on Basic Research, in-

troduced H.R. 1550, the Fire Administration Authorization Act of 1999, a bill to authorize appropriations for USFA for Fiscal Years 2000 and 2001.

The Committee met to consider H.R. 1550 on Thursday, April 29, 1999. H.R. 1550, as amended, was passed by the Committee by voice vote (Report No. 106–133).

H.R. 1550 passed the House under Suspension of the Rules on May 11, 1999 on a recorded vote of 417 to 3.

Earthquakes Hazards Reduction.—The Subcommittee on Basic Research of the Committee on Science held a hearing on February 23, 1999 to hear testimony on the Administration's FY 2000 budget request for NEHRP and to examine issues related to a two-year authorization for the Program.

H.R. 1184, a bill to authorize appropriations for carrying out the Earthquake Hazards Reduction Act of 1977 for FYs 2000 and 2001 and for other purposes, was introduced on March 18, 1999 by Representative Nick Smith, Chairman of the Subcommittee on Basic Research, joined by Representative Constance Morella, Chairwoman of the Subcommittee on Technology.

The Committee met to consider H.R. 1184 on March 25, 1999. H.R. 1184, as amended, was passed by the Committee by voice vote (Report No. 106–99 Part 1).

H.R. 1184, with a "Buy American" amendment offered by Representative Jim Traficant, was passed by the House on April 21, 1999 on a recorded vote of 414 to 3.

CHAPTER II—OTHER LEGISLATIVE ACTIVITIES OF THE COMMITTEE ON SCIENCE

2.1—MARINE RESEARCH AND RELATED ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAMS AUTHORIZATION ACT OF 1999 (H.R. 1552)

Background and summary of legislation

The Subcommittee heard testimony relevant to the programs authorized in H.R. 1553 at hearings held on February 24 and April 15, 1999. Subsequently, Subcommittee on Energy and Environment Chairman Ken Calvert (CA–43) introduced H.R. 1552, the Marine Research and Related Environmental Research and Development Programs Authorization Act of 1999, on April 26, 1999, and the bill was referred to the House Committee on Science, and in addition to the Committee on Resources, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned.

The Full Science Committee met to consider H.R. 1552 on April 29, 1999. The Committee ordered the bill reported, amended, by Voice Vote, on April 29, and reported the measure to the House with written report, H. Rept. 106–987, Part I, on October 18, 2000.

The House Committee on Resources referred H.R. 1552 to the Subcommittee on Fisheries Conservation, Wildlife and Oceans on April 27, 1999. The Subcommittee considered the measure on May 6, and forwarded it to the Full Resources Committee, amended, by Voice Vote, on May 6, 1999. The Full Resources Committee met to consider H.R. 1552 on June 30, 1999. The Committee on Resources ordered the bill reported, amended, by Voice Vote, on June 30.

As reported by the Science Committee, Sections 3 through 7 of H.R. 1552 authorize a total of $373,392,000 for each of FYs 2000 and 2001 for the NOAA and National Science Foundation (NSF), including: (1) $200,343,000 for each of FYs 2000 and 2001 for National Ocean Service (NOS); (2) $44,320,000 for each of FYs 2000 and 2001 for NOAA's OAR; (3) $63,769,000 for each of FYs 2000 and 2001 for NOAA Program Support; (4) $5,717,000 for each of FYs 2000 and 2001 for NOAA Facilities; (5) $9,243,000 for each of FYs 2000 and 2001 for NOAA Fleet Maintenance, Planning and Replacement; and (6) $50,000,000 for each of FYs 2000 and 2001 for NSF Fleet Maintenance, Planning and Replacement.

In addition, Section 7 also directs the NSF to develop a strategy for meeting such requirements and other Federal marine research and related environmental research and development requirements, considering all options, including methods of acquiring vessel services, remote sensing, and any other possible means.

Section 8 directs the Secretary of Commerce to enter into contracts, including multiyear contracts, subject to certain requirements, for the use of vessels to conduct marine research and re-

lated environmental research and development activities, monitoring, enforcement, and management (with exceptions), and to acquire other data necessary for carrying out the NOAA's missions. It prohibits the Secretary from entering into any contract for the construction, lease-purchase, upgrade, or service life extension of any vessel, directs the Secretary to use excess capacity of University-National Oceanographic Laboratory System vessels where appropriate, and permits the Secretary to enter into memoranda of agreement with the operators of these vessels for carrying out such requirement.

Section 9 repeals the NOAA Fleet Modernization Act.

Section 10 directs the NOAA Administrator to make available through NOAA's Internet home page the abstracts relating to all research grants and awards made with funds authorized by the bill.

Section 11 of the bill requires the NOAA Administrator to exclude from consideration for grant agreements made after FY 1999 under the activities for which funds are authorized under the bill, any person who received funds (other than due to membership in a class specified by law for which assistance is awarded to class members according to a formula) appropriated for a fiscal year after FY 1999 under a grant agreement from any Federal funding source for a project that was not subjected to a competitive, merit-based award process. It also makes such exclusion effective for a period of five years after receipt of such Federal funds.

2.2—NATIONAL WEATHER SERVICE AND RELATED AGENCIES AUTHORIZATION ACT OF 1999 (H.R. 1553)

Background and summary of legislation

The Subcommittee heard testimony relevant to the programs authorized in H.R. 1553 at a hearing held on February 24, 1999. Subsequently, Subcommittee on Energy and Environment Chairman Ken Calvert (CA–43) introduced H.R. 1553, the National Weather Service and Related Agencies Authorization Act of 1999, on April 26, 1999, and the bill was referred to the House Committee on Science.

The Full Science Committee met to consider H.R. 1553 on April 29, 1999. The Committee ordered the bill reported, amended, on April 16, and reported the measure to the House with written report, H. Rept. 106–146, on May 18, 1999.

The House passed H.R. 1553, amended, on May 19, 1999, and the bill was received in the Senate on May 20, 1999, and was referred immediately to the Senate Committee on Commerce, Science, and Transportation.

As passed by the House, Sections 3, 4 and 5 of H.R. 1553 authorize a total of $1,391,418,000 for FY 2000 and $1,458,552,000 for FY 2001 for a number of National Oceanic and Atmospheric Administration (NOAA) programs, including: (1) $687,529,000 for FY 2000 and $688,017,000 for FY 2001 for the National Weather Service (NWS); $183,290,000 for FY 2000 and $187,410,000 for FY 2001 for Atmospheric Research within the NOAA Office of Oceanic and Atmospheric Research (OAR); (3) $516,749,000 for FY 2000 and $579,275,000 for FY 2001 for the National Environmental Satellite,

Data and Information Service (NESDIS); and (5) $3,850,000 for each of FYs 2000 and 2001 for Facilities.

In addition, Section 3 of the bill revises requirements for the Secretary of Commerce's duties with respect to the NWS to include responsibilities for: (1) serving as the sole official source of weather and flood warnings; (2) issuing storm warnings; (3) collecting, exchanging, and distributing meteorological, hydrological, climatic, and oceanographic data and information; (4) preparing hydrometeorological guidance and core forecast information; and (5) issuing marine and aviation forecasts and warnings. It bars the NWS from providing or assisting other entities to provide a service that is currently provided or can be provided by commercial enterprise, unless: (1) the service provides vital weather warnings and forecasts for the protection of life and property of the general public; or (2) the U.S. Government is obligated to provide such service under international aviation agreements to provide meteorological services and exchange meteorological information. Section 3 also directs the Secretary to report to the Committee on Science of the House of Representatives and the Committee on Commerce, Science, And Transportation of the Senate detailing all NWS activities which do not conform to requirements of the bill and outlining a timetable for their termination. And it expresses the sense of the Congress that NWS must fully take into account the dangerous and life threatening nature of weather patterns in Wind Zone IV, otherwise known as tornado alley, before making any determination to close any of its local weather service offices.

Section 7 of the bill requires the NOAA Administrator to exclude from consideration for grant agreements made after FY 1999, under the activities for which funds are authorized under the bill, any person who received funds (other than due to membership in a class specified by law for which assistance is awarded to class members according to a formula) appropriated for a fiscal year after FY 1999 under a grant agreement from any Federal funding source for a project that was not subjected to a competitive, merit-based award process. It also makes such exclusion effective for a period of five years after receipt of such Federal funds.

Section 8 directs the NOAA Administrator to make available through NOAA's Internet home page the abstracts relating to all research grants and awards made with funds authorized by the bill.

Section 9 prohibits any funds authorized pursuant to the bill from being expended by an entity unless such entity agrees, in expending such assistance, to comply with the Act of March 3, 1933, known as the Buy American Act.

Section 10 expresses the sense of the Congress that entities receiving any equipment or products that may be authorized to be purchased with financial assistance provided under the bill should, in expending such assistance, purchase only American-made equipment and products. It also requires the Secretary to provide a notice describing such statement to each recipient of such assistance.

Section 11 prohibits any person who has been finally determined by a court or Federal agency to have intentionally affixed a label bearing a "Made in America" inscription or any inscription with the same meaning to any product sold in or shipped to the United

States that is not made in the United States, from receiving any contract or subcontract made with funds provided pursuant to the bill, pursuant to debarment, suspension, and ineligibility procedures.

2.3—DEPARTMENT OF ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION AUTHORIZATION ACT OF 1999 (H.R. 1655)

Background and summary of legislation

The Subcommittee heard testimony relevant to the programs authorized in H.R. 1655 at hearings held on March 3, March 10, March 24, and April 14, 1999. Subsequently, Subcommittee on Energy and Environment Chairman Ken Calvert (CA–43) introduced H.R. 1655, the Department of Energy [DOE] Research, Development, and Demonstration Authorization Act of 1999, on May 3, 1999, and the bill was referred to the House Committee on Science.

The Full Science Committee met to consider H.R. 1656 on May 25, 1999. The Committee ordered the bill reported, amended, by a Yea and Nay Vote of 31 to 1, on May 25, 1999, and reported the measure to the House with written report, H. Rept. 106–243, on July 20, 2000.

The House considered H.R. 1655 on September 15, 1999, and passed the bill, amended, by Voice Vote. H.R. 1655 was received in the Senate on September 16, 1999, and referred to the Senate Committee on Energy and Natural Resources.

As passed by the House, Section 3 of H.R. 1655 authorizes to be appropriated to the Secretary of Energy for DOE civilian energy and scientific RD&D and related commercial application of energy technology programs, projects, and activities $4,115,506,000 for FY 2000 and $4,242,665,110 for FY 2001, of which: (1) $482,266,000 for FY 2000 and $504,595,630 for FY 2001 is for Energy Supply; (2) $2,657,761,000 for FY 2000 and $2,691,465,000 for FY 2001 is for Science; (3) $397,564,000 for FY 2000 and $427,102,000 for FY 2001 is for Fossil Energy R&D; and (4) $577,915,000 for FY 2000 and $619,502,480 for FY 2001 is for Energy Conservation R&D.

Section 4 directs the Secretary, acting through the Assistant Secretary for Fossil Energy, to commence a program of gas hydrate energy and scientific and environmental research and development. It also authorizes $5.0 million for FY 2000 and $7.5 million for FY 2001 for grants to, or contracts or cooperative agreements with, institutions of higher education and industrial enterprises to carry out gas hydrate research, development, and demonstration programs.

Section 5 requires notice to specified congressional committees before any major reorganization of any DOE civilian energy or scientific research, development, or demonstration or related commercial application of energy technology program.

Section 6 permits DOE to provide funding, with respect to programs and activities described by the bill, only for technologies and processes that can be reasonably expected to yield new, measurable benefits to the cost, efficiency, or performance of the technology or process. It also prohibits the Secretary, as part of the test and demonstration Parallex Project, from selecting a route for the transportation of Mixed Oxide Fuel from Los Alamos, New Mexico, to Chalk

River, Canada, without issuing a rule based on the record after an opportunity for agency hearing.

Sections 7, 8 and 9 set forth specified prohibitions and congressional reporting requirements for projects that exceed certain cost limits, including general plant projects, construction projects and those relating to conceptual or construction design.

Section 10 prohibits the obligation of funds for construction of a specified project at the Spallation Neutron Source at the Oak Ridge Laboratory in Tennessee until: (1) the Secretary certifies that senior project management positions for the project have been filled by qualified individuals and provides information regarding costs, milestones, laboratory obligations, and management structure; and (2) the Comptroller General reports to Congress that the estimated tax reimbursements that DOE would pay to its contractors as a cost of constructing the project in Tennessee would be no more than the reimbursements it would pay if the same project were constructed at the Lawrence Berkeley National Laboratory in California, the Argonne National Laboratory in Illinois, the Los Alamos National Laboratory in New Mexico, or the Brookhaven National Laboratory in New York. It also requires the Secretary to report annually to Congress on such project as part of DOE's budget submission.

In addition, Section 10 prohibits the use of funds authorized by the bill for: (1) U.S. participation in International Thermonuclear Experimental Reactor Engineering Design Activities; (2) the salaries of specified DOE Office of Science directors unless such individuals hold postgraduate degrees in science or engineering; and (3) grants or contracts awarded by DOE to a trade association on a noncompetitive basis. It reduces each of the amounts authorized by the bill for FY 2000 by: (1) one percent; and (2) 0.7674 percent, with each such reduction representing a reduction in travel costs. It also reduces each of the amounts authorized for FY 2000 administrative expenses proportionately to achieve additional savings of $30 million, and limits travel costs to one percent of the total amounts of funds authorized.

Section 11 prohibits the use of funds authorized for programs under the bill to award management and operating contracts for federally owned or operated DOE civilian energy laboratories on a noncompetitive basis.

Section 12 prohibits the use of funds authorized for programs under the bill to award or modify a DOE contract in a manner that deviates from the Federal Acquisition Regulation unless the Secretary grants a waiver to allow for such deviations.

Section 13 prohibits the use of funds authorized to be appropriated by the bill by DOE to prepare or initiate Requests for Proposals for programs under the bill not specifically authorized by Congress.

Section 14 prohibits the use of funds authorized to be appropriated by the bill to produce or provide articles or services for purposes of selling them to a person outside the Federal Government unless the Secretary determines that such articles or services are not available from a U.S. commercial source.

Section 15 excludes from consideration for grant agreements for programs described by the bill made by DOE after FY 1999 any

person who received funds appropriated for a fiscal year after FY 1999 under a grant agreement from any Federal funding source for a program that was not subjected to a competitive, merit-based award process. It also makes such exclusions effective for a period of five years after the person receives such Federal funds.

Section 16 requires the Secretary to make available through the DOE's Internet home page the abstracts relating to all research grants and awards made with funds authorized by the bill.

Section 17 bars the Secretary from admitting to any classified area of a federally owned or operated nonmilitary energy laboratory any individual who is a citizen of a nation that is named on the DOE List of Sensitive Countries. It authorizes waivers of such prohibition on a case-by-case basis with respect to individuals whose admission is determined to be necessary for the furtherance of U.S. civilian science interests. It also sets forth congressional notification and certification procedures with respect to such waivers, and makes this section inapplicable to specified facilities.

Section 18 prohibits any funds authorized pursuant to the bill from being expended by an entity unless such entity agrees, in expending such assistance, to comply with the Act of March 3, 1933, known as the Buy American Act.

Section 19 expresses the sense of the Congress that entities receiving any equipment or products that may be authorized to be purchased with financial assistance provided under the bill should, in expending such assistance, purchase only American-made equipment and products. It also requires the Secretary to provide each recipient of such assistance a notice describing such statement.

Section 20 prohibits any person who has been finally determined by a court or Federal agency to have intentionally affixed a label bearing a "Made in America" inscription or any inscription with the same meaning to any product sold in or shipped to the United States that is not made in the United States, from receiving any contract or subcontract made with funds provided pursuant to the bill, pursuant to debarment, suspension, and ineligibility procedures.

Section 21 requires the Secretary to commence a program of R&D on the technology necessary to achieve on-site transmutation of nuclear waste into nonradioactive substances, and authorizes $2.0 million for FY 2000 and $4.0 million in FY 2001 for grants or contracts to, or cooperative agreements with, institutions of higher education and industrial enterprises to carry out such program. It also bars the Secretary from supporting a technology that involves the isolation of plutonium or uranium.

Section 22 expresses the sense of the Congress that DOE should increase its efforts to recruit and employ qualified minorities for carrying out research and development functions.

2.4—DEPARTMENT OF ENERGY COMMERCIAL APPLICATION OF ENERGY TECHNOLOGY AUTHORIZATION ACT OF 1999 (H.R. 1656)

Background and summary of legislation

The Subcommittee heard testimony relevant to the programs authorized in H.R. 1656 at hearings held on March 3, March 10, March 24, and April 14, 1999. Subsequently, Subcommittee on En-

ergy and Environment Chairman Ken Calvert (CA–43) introduced H.R. 1656, the Department of Energy [DOE] Commercial Application of Energy Technology Authorization Act of 1999, on May 3, 1999, and the bill was referred to the House Committee on Science, and in addition to the Committees on Commerce, and Education and the Workforce, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned.

The Full Science Committee met to consider H.R. 1656 on May 26, 1999. The Committee ordered the bill reported, amended, by Voice Vote, on May 26, 1999, and reported the measure to the House with written report, H. Rept. 106–492, Part 1, on March 6, 2000.

Within the Committee on Commerce, H.R. 1656 was referred to the Subcommittee on Energy and Power on May 17, 1999. The Committee was discharged from further consideration of the bill on June 9, 2000.

Within the Committee on Education and the Workforce, H.R. 1656 was referred to the Subcommittee on Subcommittee on Workforce Protections on May 21, 1999. The Committee was also discharged from further consideration of the bill on June 9, 2000.

As reported, Section 3 of H.R. 1656 authorizes for DOE civilian commercial application of energy technology and related energy and scientific RD&D programs, projects, and activities $702,759,000 for FY 2000 and $711,746,890 for FY 2001, to remain available through the end of FY 2002, of which: (1) $309,662,000 for FY 2000 and $306,857,000 for FY 2001 is for Energy Supply; (2) $330,934,000 for FY 2000 and $340,862,000 for FY 2001 is for Non-Defense Environmental Management; (3) $10,000,000 for FY 2000 and $10,300,000 for FY 2001 is for Fossil Energy R&D; and (4) $52,163,000 for FY 2000 and $53,727,890 for FY 2001 is for Energy Conservation R&D.

Section 4 authorizes reprogramming of DOE funds for any authorized DOE civilian energy or scientific research, development, or demonstration or commercial application of energy technology programs, projects, or activities, subject to certain reporting requirements. It also requires notice to specified congressional committees before any major reorganization of any DOE civilian program.

Section 5 permits DOE to provide funding, with respect to programs and activities described by the bill, only for technologies or processes that can be reasonably expected to yield new, measurable benefits to the cost, efficiency, or performance of the technology or process.

Sections 6, 7 and 8 set forth specified prohibitions and congressional reporting requirements for projects that exceed certain cost limits, including general plant projects, construction projects and those relating to conceptual or construction design.

Section 9 prohibits the use of funds in the Clean Coal Technology Reserve to initiate or carry out a clean coal technology energy demonstration project based outside the United States. It also bars the use of funds authorized by the bill for grants or contracts awarded by DOE to a trade association on a noncompetitive basis.

Section 10 prohibits the use of funds to award management and operating contracts for federally owned or operated nonmilitary DOE energy laboratories on a noncompetitive basis.

Section 11 prohibits the use of funds to award or modify a DOE contract in a manner that deviates from the Federal Acquisition Regulation, unless the Secretary grants a waiver.

Section 12 prohibits the use of funds by DOE to prepare or initiate Requests for Proposals for DOE civilian programs not specifically authorized by Congress.

Section 13 prohibits the use of funds for DOE civilian programs to produce or provide articles or services for purposes of selling them to a person outside the Federal Government, unless the Secretary determines that such articles or services are not available from a U.S. commercial source. It also exempts from the prohibition on such sale the transmission and sale of electricity by any Federal Power Marketing Administration.

Section 14 excludes from consideration for grant agreements for DOE civilian programs described by the bill after FY 1999 any person who received funds appropriated for a fiscal year after FY 1999 under a grant agreement from any Federal funding source for a program that was not subjected to a competitive, merit-based award process. It makes such exclusions effective for a period of five years after the person receives such Federal funds.

Section 15 terminates DOE regulatory or enforcement authority, effective January 1, 2000, with respect to Federal, State, and local environmental, safety, and health requirements at any federally owned or operated nonmilitary energy laboratory. In addition, Section 15:

- Requires DOE to retain such authority at any such laboratory to the extent that no other agency has such authority;
- Directs the Nuclear Regulatory Commission (NRC), effective January 1, 2000, to assume DOE regulatory and enforcement authorities under the Atomic Energy Act of 1954 with regard to federally owned or operated nonmilitary energy laboratories;
- Provides that contractors operating such facilities shall not be responsible for the costs of decommissioning them;
- Prohibits enforcement actions against such contractors for violations of NRC decommissioning requirements if the violation is the result of a DOE failure to authorize or fund decommissioning activities;
- Requires the NRC and DOE to enter into a memorandum of understanding establishing decommissioning requirements for such laboratories;
- Directs the Occupational Safety and Health Administration (OSHA), effective January 1, 2000, to assume DOE regulatory and enforcement responsibilities relating to matters covered by the Occupational Safety and Health Act of 1970 with regard to all federally owned or operated nonmilitary energy laboratories;
- Requires the NRC and OSHA to enter into a memorandum of understanding to govern their respective authorities over occupational safety and health hazards at such laboratories;

- Absolves a DOE contractor operating a federally owned or operated nonmilitary energy laboratory of liability for civil penalties under the Atomic Energy Act of 1954 or the Occupational Health and Safety Act of 1970 for any actions taken before October 1, 2000, pursuant to the transfer of regulatory and enforcement responsibilities required by the bill; and
- Requires the Secretary to: (1) continue to indemnify such laboratories in accordance with the Atomic Energy Act of 1954; and (2) transmit a plan for termination of DOE's regulatory and enforcement responsibilities for such laboratories to specified congressional committees.

Section 16 directs the Secretary to make available through the DOE Internet home page abstracts relating to all research grants and awards made with funds authorized by the bill.

Section 17 declares a moratorium on the Foreign Visitors Program, during which the Secretary may not, until certain counterintelligence and safeguards and security measures are fully implemented, admit any citizen of a nation named on the current DOE List of Sensitive Countries to certain DOE-owned classified laboratory facilities. It also requires the Director of the FBI and the Secretary to transmit jointly to certain congressional committees an annual report on counterintelligence and safeguards and security activities at DOE laboratories.

Section 18 instructs the Secretary to ensure: (1) consistency of technology transfer policies and procedures with respect to patenting, licensing, and commercialization; (2) availability of alternative modes of dispute resolution, mediation, and negotiation with respect to technology transfer and intellectual property matters; (3) annual reports to the Secretary on technology transfer and intellectual property successes, disputes, and subsequent resolution; and (4) laboratory personnel training on legal, procedural, and ethical issues affecting patenting, licensing, and commercialization activities.

Section 19 amends the Atomic Energy Act of 1954 to set forth civil monetary penalties for violations of DOE regulations regarding security of classified or sensitive information or data.

Section 20 directs the Secretary to establish a whistleblower protection program to ensure against reprisal actions against a DOE or contractor employee for disclosing evidence of a certain violations.

Section 21 sets forth procedural guidelines governing the investigation and remediation of alleged reprisals for disclosure of certain information to Congress.

2.5—ENVIRONMENTAL PROTECTION AGENCY OFFICE OF RESEARCH AND DEVELOPMENT AND SCIENCE ADVISORY BOARD AUTHORIZATION ACT OF 1999 (H.R. 1742)

Background and summary of legislation

The Subcommittee heard testimony relevant to the programs authorized in H.R. 1742 at hearings held on March 18, 1999. Subsequently, Subcommittee on Energy and Environment Chairman Ken Calvert (CA–43) introduced H.R. 1742, the Environmental Protection Agency [EPA] Office of Research and Development [ORD] and

Science Advisory Board [SAB] Authorization Act of 1999, on May 10, 1999, and the bill was referred to the House Committee on Science.

The Full Science Committee met to consider H.R. 1743 on May 26, 1999. The Committee ordered the bill reported, amended, by Voice Vote, on May 26, 1999, and reported the measure to the House with written report, H. Rept. 106–511, on March 6, 2000.

As reported, Section 3 of H.R. 1743 authorizes to be appropriated to the EPA Administrator for ORD environmental R&D and scientific RD&D programs $504,022,100 for FY 2000 and $519,940,600 for FY 2001, to remain available until expended, of which: (1) $2,000,000 for FY 2000 and $2,000,000 for FY 2001 shall be for the Mickey Leland Urban Air Toxics Research Center; (2) $5,000,000 for FY 2000 and $5,000,000 for FY 2001 shall be for the Gulf Coast Hazardous Substance Research Center; and (3) $1,000,000 for FY 2000 shall be for a field-scale environmental R&D project at an existing site for remediation of soils contaminated by recalcitrant hydrocarbon and lead contaminants. In addition, Section 6 of the bill authorizes to be appropriated to the EPA Administrator for SAB activities $2,636,200 for FY 2000 and $2,768,000 for FY 2001, to remain available until expended.

Section 4 establishes the EPA Assistant Administrator for ORD as EPA's chief scientific official in charge of the Agency's environmental R&D and scientific RD&D strategic planning. It also requires the EPA Assistant Administrator for ORD to review all EPA environmental R&D and scientific RD&D programs to ensure that the RD&D is of high quality and does not duplicate other Agency programs, and to report annually to Congress on such programs that are not of high quality or that duplicate other programs;

Section 5 ensures that fellowship awards to students selected under the STAR Graduate Student Fellowship Program are used to support only scientific research that furthers the mission of the ORD;

Section 6 strengthens and institutionalizes the role of the SAB in analyzing and evaluating EPA's current and planned environmental R&D and scientific RD&D programs and associated budgets;

Section 7 limits the amounts of funds that may be reprogrammed.

Section 8 requires the EPA Administrator to provide to the Congress at the same time as the budget request submission a detailed budget justification for programs, projects and activities authorized by the bill.

Section 9 provides that not more than one percent of the funds authorized by the bill may be used either directly or indirectly to fund travel costs of the Agency or travel costs for persons awarded contracts or subcontracts by the Agency. As part of the Agency's annual budget request submission to the Congress, the Administrator must submit a report to the Committee on Science and Committee on Appropriations of the House, and to the Committee on Energy and Natural Resources and Committee on Appropriations of the Senate that identifies: (1) the estimated amount of travel costs by the Agency and for persons awarded contracts or subcontracts by the Agency for the fiscal year of such budget submis-

sion, as well as for the two previous years; (2) the major purposes for such travel; and (3) the sources of funds for such travel. In addition, Section 9 provides that no funds authorized by the bill may be used either directly or indirectly to fund a grant, contract, subcontract or any other form of financial assistance awarded by the Agency to a trade association on a noncompetitive basis. As part of the Agency's annual budget request submission to the Congress, the Administrator shall also submit a report to the Committee on Science and Committee on Appropriations of the House, and to the Committee on Environment and Public Works and Committee on Appropriations of the Senate that shall identify: (1) the estimated amount of funds provided by the Agency to trade associations, by trade association, for the fiscal year of such budget submission, as well as for the two previous fiscal years; (2) the services either provided or to be provided by each such trade association; and (3) the sources of funds for services provided by each such trade association. Section 9 also provides that none of the funds authorized by the bill may be used to propose or issue rules, regulations, decrees, or orders for the purpose of implementation of, or in preparation for implementation of, the Kyoto Protocol.

Subsection 10 requires that the Agency only provide funding for scientific demonstration projects of the ORD or the SAB for technologies or processes that can be reasonably expected to yield new, measurable benefits to the cost, efficiency, or performance of the technology or process.

Subsection 11 prohibits the use of funds authorized by the bill may be used to award, amend, or modify a contract of ORD or SAB in a manner that deviates from the Federal Acquisition Regulation unless the EPA Administrator grants, on a case-by-case basis, a waiver to allow for such a deviation. The Administrator may not delegate the authority to grant such a waiver. It also requires that at least 60 days before a contract award, amendment, or modification for which the Administrator intends to grant such a waiver, the Administrator shall submit to the Committee on Science and the Committee on Appropriations of the House, and to the Committee on Environment and Public Works and the Committee on Appropriations of the Senate, a report notifying the committees of the waiver and setting forth the reasons for the waiver.

Subsection 12 prohibits the Agency from using funds authorized by the bill to prepare or initiate Request for Proposals for a program, project or activity if Congress has not specifically authorized the program, project or activity.

Section 13 prohibits the use of funds authorized under the bill by any program, project or activity of ORD or SAB to produce or provide articles or services for the purpose of selling to a person outside the Federal Government, unless the Administrator determines that comparable articles or services are no available from a commercial source in the United States.

Section 14 excludes from consideration for grant agreements made after 1999 by the ORD or the SAB for a period of five years—under the programs, projects and activities for which funds are authorized under the bill—any person who received funding for a project not subject to a competitive, merit-based award process, except as specifically authorized by the bill.

Section 15 requires the EPA Administrator to make available through EPA's Internet home page the abstracts relating to all research grants and awards made with funds authorized by the bill.

2.6—ENVIRONMENTAL PROTECTION AGENCY OFFICE OF AIR AND RADIATION AUTHORIZATION ACT OF 1999 (H.R. 1743)

Background and summary of legislation

The Subcommittee heard testimony relevant to the programs authorized in H.R. 1743 at hearings held on March 18 and April 14, 1999. Subsequently, Subcommittee on Energy and Environment Chairman Ken Calvert (CA–43) introduced H.R. 1743, the Environmental Protection Agency Office of Air and Radiation Authorization Act of 1999 on May 10, 1999, and the bill was referred to the House Committee on Science.

The Full Science Committee met to consider H.R. 1743 on May 26, 1999. The Committee ordered the bill reported, amended, by Voice Vote, on May 26, 1999, and reported the measure to the House with written report, H. Rept. 106–511, on March 6, 2000.

As reported, Section 3 of H.R. 1743 authorizes to be appropriated to the EPA Administrator for the OAR for environmental R&D and scientific and energy RD&D and commercial application of energy technology programs $230,116,100 for fiscal year (FY) 2000 and $237,019,600 for FY 2001, to remain available until expended, of which: (1) $124,282,600 for FY 2000 and $128,011,100 for FY 2001 shall be for Science; and (2) $105,833,500 for FY 2000 and $109,008,500 for FY 2001 shall be for the Climate Change Technology Initiative, including: (A) $39,964,000 for FY 2000 and $41,162,900 for FY 2001 for Buildings; (B) $32,702,500 for FY 2000 and $33,683,600 for FY 2001 for Transportation; (C) $19,158,000 for FY 2000 and $19,732,740 for FY 2001 for Industry; (D) $3,400,000 for FY 2000 and $3,502,000 for FY 2001 for Carbon Removal; (E) $2,987,000 for FY 2000 and $3,076,600 for FY 2001 for State and Local Climate; and (F) $7,622,000 for FY 2000 and $7,850,660 for FY 2001 for International Capacity Building. It also prohibits the obligation of any amounts authorized until 30 days after the Administrator submits to the Committee on Science and the Committee on Appropriations of the House and the Committee on Environment and Public Works and the Committee on Appropriations of the Senate, a report detailing for all ORD environmental R&D and scientific RD&D programs, projects and activities, by appropriation goal and objectives, for FY 2000 and each of the previous two FYs—(1) a description of, and funding requested or allocated for, each such program, project and activity; (2) an identification of all recipients of funds to conduct such programs, projects and activities; and (3) an estimate of the amounts to be expended by each recipient of funds identified in (2).

Section 4 limits the amounts of funds that may be reprogrammed.

Section 5 requires the EPA Administrator to provide to the Congress at the same time as the budget request submission a detailed budget justification for programs, projects and activities authorized by the bill.

Section 6 provides that not more than one percent of the funds authorized by the bill may be used either directly or indirectly to fund travel costs of the Agency or travel costs for persons awarded contracts or subcontracts by the Agency. As part of the Agency's annual budget request submission to the Congress, the Administrator must submit a report to the Committee on Science and Committee on Appropriations of the House, and to the Committee on Energy and Natural Resources and Committee on Appropriations of the Senate that identifies—(1) the estimated amount of travel costs by the Agency and for persons awarded contracts or subcontracts by the Agency for the fiscal year of such budget submission, as well as for the two previous years; (2) the major purposes for such travel; and (3) the sources of funds for such travel. In addition, Section 6 provides that no funds authorized by the bill may be used either directly or indirectly to fund a grant, contract, subcontract or any other form of financial assistance awarded by the Agency to a trade association on a noncompetitive basis. As part of the Agency's annual budget request submission to the Congress, the Administrator shall also submit a report to the Committee on Science and Committee on Appropriations of the House, and to the Committee on Environment and Public Works and Committee on Appropriations of the Senate that shall identify: (1) the estimated amount of funds provided by the Agency to trade associations, by trade association, for the fiscal year of such budget submission, as well as for the two previous fiscal years; (2) the services either provided or to be provided by each such trade association; and (3) the sources of funds for services provided by each such trade association. Section 6 also provides that none of the funds authorized by the bill may be used to propose or issue rules, regulations, decrees, or orders for the purpose of implementation of, or in preparation for implementation of, the Kyoto Protocol.

Subsection 7 requires that the Agency only provide funding for scientific or energy or commercial application of energy technology demonstration programs of the OAR for technologies or processes that can be reasonably expected to yield new, measurable benefits to the cost, efficiency, or performance of the technology or process.

Section 8 prohibits the use of funds authorized by the bill to be used to award, amend, or modify a contract of OAR in a manner that deviates from the Federal Acquisition Regulation unless the Administrator grants, on a case-by-case basis, a waiver to allow for such a deviation. The EPA Administrator may not delegate the authority to grant such a waiver.

Subsection 9 prohibits the Agency from using funds authorized by the bill to prepare or initiate Request for Proposals for a program, project or activity if Congress has not specifically authorized the program, project or activity.

Section 10 prohibits the use of funds authorized under the bill by any program, project or activity of OAR to produce or provide articles or services for the purpose of selling to a person outside the Federal Government, unless the Administrator determines that comparable articles or services are not available from a commercial source in the U.S.

Section 11 excludes from consideration for grant agreements made after 1999 by the ORD or the SAB for a period of five years-

under the programs, projects and activities for which funds are authorized under the bill—any person who received funding for a project not subject to a competitive, merit-based award process, except as specifically authorized by the bill.

Section 12 requires the EPA Administrator to make available through EPA's Internet home page the abstracts relating to all research grants and awards made with funds authorized by the bill.

2.7—NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY AUTHORIZATION ACT OF 1999 (H.R. 1744)

Background and summary of legislation

Congresswoman Constance Morella introduced H.R. 1744 to the House. Its mission is to promote economic growth by working with industry to develop and apply technology, measurements and standards. As the Nation's arbiter of standards, NIST enables our country's businesses to engage each other in commerce and participate in the global marketplace. H.R. 1744 authorizes a total of $693,413,000 in FY 2000 and $586,252,000 in FY 2001 for NIST to carry-out its mission. Specific provisions of the legislation are as follows:

- H.R. 1744 authorizes $274,513,000 for NIST laboratory functions in FY 2000 and $285,152,000 in FY 2001.
- H.R. 1744 authorizes $5,100,000 for the Baldrige National Quality Program in both FY 2000 and FY 2001.
- H.R. 1744 authorizes $106,800,000 for construction and maintenance improvements in FY 2000 and $31,800,000 in FY 2001.
- H.R. 1744 authorizes $7,500,000 for the Under Secretary for Technology and the Office of Technology Policy in both FY 2000 and FY 2001.
- H.R. 1744 authorizes $106,800,000 for the Manufacturing Extension Partnerships Program in both FY 2000 and FY 2001.
- H.R. 1744 authorizes $190,700,000 for the Advanced Technology Program (ATP) in FY 2000 and $149,900,000 in FY 2001.
- H.R. 1744 authorizes $2,000,000 for the National Technical Information Service in FY 2000.

H.R. 1744 increases the ATP match requirement to 60 percent for non-small business grant recipients and joint ventures and stipulates that grants can only be awarded to projects that would not proceed in a timely manner without federal assistance.

H.R. 1744 was referred to the committee on May 5, 1999. Committee consideration and mark-up session was held on May 26, 1999.

2.8—NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT ACT (H.R. 2086/H.R. 4940)

Background and summary of legislation

On June 9, 1999, Committee on Science Chairman F. James Sensenbrenner, Jr. introduced H.R. 2086, the Networking and Information Technology Research and Development Act (NITRD). NITRD is a five-year authorization bill that would amend the High-Performance Computing Act of 1991 and return the Federal Government's emphasis on IT funding to basic research. This bipartisan legislation was introduced with 25 co-sponsors and was

drafted to reinvigorate basic research programs in IT under the jurisdiction of the Science Committee.

The purpose of H.R. 2086 is to authorize appropriations for Fiscal Years 2000 through 2004 for networking and information technology research and development at the National Science Foundation, National Aeronautics and Space Administration, Department of Energy, National Institute of Standards and Technology, National Oceanic and Atmospheric Administration, and Environmental Protection Agency.

On February 15, 2000, the House passed H.R. 2086 by voice vote. Language was introduced on the House floor to authorize NIH IT R&D. The Senate took no action on H.R. 2086. With the exception of some increased funding for the Department of Energy requested by the Senate, Title II of H.R. 4940 is virtually identical to H.R. 2086. H.R. 4940 passed the House by voice vote on October 24, 2000.

For fiscal years 2000 through 2004, H.R. 4940 authorizes a total of $7.4 billion for the six agencies participating in the High-Performance Computing and Communications, Next Generation Internet (NGI), and new NITRD programs. For the programs within the jurisdiction of the Committee on Science, H.R. 4940 nearly doubles IT funding over the five- year authorization of the bill. Total funding authorizations, agencies and programs are as follows:

- $4,082.7 million for NSF, including:
  - —$155 million for large grants of up to $1 million for high-end computing, software, and networking research;
  - —$250 million for information technology research centers;
  - —$385 million for terascale computing;
  - —$95 million for universities to establish internship programs for research at private companies;
  - —$56 million for educational technology research; and
  - —$50 million for the NGI program;
- $903 million for DOE (including $30 million for the NGI program);
- $1,048.4 million for NASA (including $20 million for the NGI program);
- $73 million for NIST (including $11 million for the NGI program);
- $71.7 million for NOAA; and
- $22.3 million for EPA.

New Large Research Grants—H.R. 4940 establishes a new pool of grant funding at NSF. These grants are limited to long-term, basic IT research with priority given to research which helps address issues related to high-end computing, software, social and economic consequences of IT, and network stability, fragility, security (including privacy) and scalability. All grants are required to be peer reviewed by panels that include private sector representatives.

IT Research Centers—H.R. 4940 sets aside $250 million for the establishment of IT centers of six or more researchers entering into multi-disciplinary collaborations for large-scale, long-term basic IT research projects.

Education and Training—H.R. 4940 establishes a $95 million program to award grants to college students (including community college students) to create for-credit IT industry internship pro-

grams at two and four year colleges and fund NSF's Advanced Technology Education program to improve education in fields related to IT. To participate in the internship program, a company must commit to providing 50 percent of the cost of the internship.

Hardware Acquisition—H.R. 4940 authorizes NSF to administer a new combined terascale computing acquisition program. The program is authorized a total of $385 million, which will be allocated in an open competition by NSF. Awardees must agree to integrate with the existing Advanced Partnership for Advanced Computational Infrastructure program and give access to NITRD research grant recipients.

2.9—SMALL BUSINESS INNOVATION RESEARCH PROGRAM REAUTHORIZATION ACT OF 1999 (H.R. 2392)/CONSOLIDATED APPROPRIATIONS ACT, 2001, CONFERENCE REPORT H. REPT. 106–1033 (H.R. 4577)/SMALL BUSINESS REAUTHORIZATION ACT (H.R. 5667)/CERTIFIED DEVELOPMENT COMPANY PROGRAM IMPROVEMENTS ACT OF 2000 (H.R. 2614)

The Small Business Innovation Research Program Reauthorization Act of 2000 (H.R. 2392) was introduced on June 30, 1999, and referred to the House Committees on Small Business and Science. Both Committees held hearings and the House Committee on Small Business reported H.R. 2392 on September 23, 1999 (H. Rept. 106–329). In the interest of moving the bill to the floor of the House of Representatives promptly, the Committee on Science agreed not to exercise its right to report the legislation, provided that the House Committee on Small Business agreed to add the selected portions of the Science Committee version of the legislation, as Sections 8 through 11 on the House Floor. H.R. 2392 passed the House without further amendment on September 27. The Science Committee provisions were explained in floor statements by Congressmen Sensenbrenner, Morella, and Mark Udall.

Variations of the bill (involving small business reauthorizations; the SBIR language remained the same) had been volleyed between the House and Senate, including incorporation into the H.R. 2614 conference report, The Certified Development Company Program Improvements Act of 2000 (the tax relief package). It passed the House on October 26, 2000 and was considered (did not pass) by the Senate on October 30. Final passage occurred when H.R. 5667, the Small Business Reauthorization Act of 2000 (title I incorporated a version of H.R. 2392) was incorporated into the Conference Report (H. Rept. 106–1033) of H.R. 4577, FY 2001 Labor, Health, and Human Services, and Education, and Related Agencies Appropriations Act, 2001 (final omnibus appropriations act).

The following provisions of H.R. 2392 (conference report section number of H.R. 5667) are incorporated into the conference report of H.R. 4577:

Section 3 (103) extends the SBIR program through fiscal year 2008.

Section 4 (104) requires the report SBA submits to Congress be sent to the Committee on Science. The report is currently received only by the House and Senate Small Business Committees.

Section 6 (110) modifies SBIR policy directives. The modifications clarify that: (1) follow-on phase III procurement contracts with an SBIR company may include procurement of products, services, re-

search, or any combination intended for use by the Federal government; (2) a commercialization plan for all applications of second phase awards moving towards commercialization be added; (3) agencies must report annually to the SBA administrator on why, if they pursued research, development, or production as a result of an SBIR award, they did not use the small business awardee.

Section 7 (106) insures that agencies in the SBIR program will submit as part of their annual performance plan under the Government Performance and Results Act, a section on the SBIR program. This report is also to be submitted to the Committee on Science, and the House and Senate Small Business Committees.

Section 8 (107) establishes a public and private database for purposes of evaluating the SBIR program. It was understood by the three committees that the SBA collection of data on SBIR was incomplete. To address this concern, H.R. 2392 specifies certain criteria that are to be collected, such as names of the company, amounts of awards, and sales. The committees also understand that the commercialization data will be difficult, but nevertheless needed to evaluate the commercialization requirement under the statute.

Section 9 (108) requires a report by the National Research Council to be submitted to Congress three years after it is commissioned, and updated 6 years thereafter. The report is designed to evaluate the SBIR program to date. The NRC is directed to evaluate how the SBIR program has stimulated technological innovation and used small businesses to meet Federal research and development needs.

Section 10 (109) requires the agencies to inform SBA how they calculate their extramural budgets. An agencies extramural budget is the budget from which SBIR funds are derived. Over the years, it has come to the attention of the committees that agencies have different methods of calculating their extramural budgets for purposes of submission to OMB and purposes of SBIR. This provision should clarify how each agency is performing their calculations.

Section 11 (111) establishes the Federal State and Technology Partnership Program. This is a five-year competitive matching grant program to encourage states to promote the development of high-technology small businesses.

Section 12 (112) establishes a mentoring network designed to bring together organizations and small businesses familiar with the SBIR program with small businesses interested in participating in SBIR. It creates a database of small businesses willing to act as mentors in this capacity.

Section 13 (113) requires SBA to simplify the SBIR reporting requirements to reduce the burden on small businesses.

Section 14 (114) extends through fiscal year 2005, section 501(b)(2) of the Small Business Reauthorization Act of 1997, and section 9(s) of the Small Business Act. These provisions are designed to increase the participation of rural small businesses in the SBIR program.

2.10—COMPUTER SECURITY ENHANCEMENT ACT OF 2000 (H.R. 2413)

Background and summary of legislation

The purpose of H.R. 2413 is to update the Computer Security Act of 1987 to improve computer security for federal civilian agencies and the private sector.

H.R. 2413 provides for greater security for the federal civilian agencies that base their procurement decisions for computer security hardware and software on NIST standards. The legislation also promotes the use of commercially available products and encourages an open exchange of information between NIST and the private sector. The legislation authorizes a total of $8,980,000 in FY 2001 and $9,560,000 in FY 2002. Specifically, the Computer Security Enhancement Act of 2000:

- Requires NIST to encourage the acquisition of commercial off-the-shelf (COTS) products to meet civilian agency computer security needs. This measure should reduce the costs of computer security technologies for federal agencies.
- Enhances the role of the independent Computer System Security and Privacy Advisory Board in NIST's decision-making process by requiring the Board, which is made up of representatives from industry, federal agencies and other external organizations, to make formal recommendations regarding proposed security standards and provide guidance to NIST on emerging computer security issues.
- Clarifies that NIST standards and guidelines are to be used for the acquisition of computer security technologies for the Federal Government and are not intended as restrictions on the production or use of encryption or electronic authentication technologies by the private sector.
- Updates the Computer Security Act by including references to computer networking which has become an increasingly important component of the Federal Government information technology system.
- Establishes a new computer science fellowship program for graduate and undergraduate students studying computer security. The bill sets aside $500,000 for the first year and $500,000 for the second year, to enable NIST to finance computer security fellowships under an existing NIST grant program.
- Requires the National Research Council (NRC) to conduct a study to assess issues associated with electronic authentication technologies.

Requires the Under Secretary of Commerce for Technology to actively promote the use of technologies by the Federal Government that will enhance the security of federal communications networks and information in electronic form; to establish a clearinghouse of information available to the public on information security threats; and to promote the development of market driven consensus standards-based infrastructures that will enable more widespread use of encryption and electronic authentication technologies for confidentiality and authentication.

On Wednesday, October 20, 1999, the Committee on Science, Subcommittee on Technology convened to mark up H.R. 2413, The Computer Security Enhancement Act of 1999, to enhance the abil-

ity of the National Institute of Standards and Technology (NIST) to improve computer security.

On Wednesday, July 26, 2000, the Committee on Science convened to mark up H.R. 2413. An amendment offered by Mrs. Morella and Mr. Barcia was offered and adopted by a voice vote. With a quorum present, Chairman Sensenbrenner moved that H.R. 2413, as amended be reported. The motion was adopted by a voice vote.

On Tuesday, October 24, 2000 the House voted to Suspend the Rules and pass H.R. 2413 as amended. The motion was agreed to by a voice vote.

2.11—APOLLO EXPLORATION AWARD ACT OF 2000 (H.R. 2572)

Background and summary of legislation

H.R. 2572, the Apollo Exploration Award Act of 2000, expresses the sense of Congress that the American people should provide a tribute to each of the Apollo astronauts to recognize and commemorate their bravery, substantial scientific and technical accomplishments, and unique contributions to American and world history.

The bill requires the Administrator of the National Aeronautics and Space Administration to design and present an Apollo Exploration Award, commemorating the accomplishments of the astronauts who flew in the Apollo program and makes a lunar rock sample its central feature. It prohibits the use of the award for monetary gain or profit or its transfer outside of the astronaut's family.

Finally, to protect the taxpayer's interest in the lunar sample, the bill provides for recall of a lunar sample contained in the award if the Administrator determines that such sample is required for scientific purposes.

The bill was introduced by Congressman Mark Souder on July 20, 1999 and eventually acquired 34 co-sponsors from both parties. It was referred to the Committee on Science on the same day. The Committee discharged the bill and the House of Representatives considered it under suspension of the rules on September 26, 2000. At the conclusion of the debate, the yeas and nays were ordered. The vote was tallied with 419 in favor and none against (Roll Call No. 490.)

The bill was received in the Senate and referred to the Committee on Commerce, Science, and Transportation on September 27, 2000.

2.12—TO PREVENT THE ELIMINATION OF CERTAIN REPORTS (H.R. 3904)

Background and summary of legislation

H.R. 3904, a bill to prevent the elimination of certain reports, passed the House on April 3, 2000. The bill prohibits the application of the Federal Reports Elimination and Sunset Act of 1995 with respect to 30 specified reports under the jurisdiction of the Science Committee, including certain reports from the National Aeronautics and Space Administration, the National Science Foundation, and the National Oceanic and Atmospheric Administration. Under the Federal Reports Elimination Act, thousands of reports submitted to Congress by the Administration are to be eliminated. H.R. 3904 exempts 30 of the hundreds of reports under the Science

Committee's jurisdiction considered to be the most relevant to the Committee's oversight function. Other Committees in Congress have taken similar action with similar bills.

The bill was referred to the Senate Governmental Affairs Committee on April 4, 2000 where it awaits action.

2.13—TO ENSURE THAT THE DEPARTMENT OF ENERGY HAS APPROPRIATE MECHANISMS TO INDEPENDENTLY ASSESS THE EFFECTIVENESS OF ITS POLICY AND SITE PERFORMANCE IN THE AREAS OF SAFEGUARDS AND SECURITY AND CYBER SECURITY (H.R. 3906)

Background and summary of legislation

Representative Tom Bliley (VA–7) introduced H.R. 3906 on March 14, 2000, and it was referred to the Committee on Commerce, and in addition to the Committees on Armed Services, and Science, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned.

Within the Committee on Commerce, H.R. 3906 was referred to the Subcommittee on Energy and Power on March 21, which held a hearing on March 22. The Subcommittee considered the measure on April 12, and forwarded it to the Full Commerce Committee, amended, by Voice Vote. The Full Commerce Committee met to consider H.R. 3906 on May 17. The Committee ordered the bill reported, amended, by Voice Vote, on May 17, and reported the measure to the House with written report, H. Rept. 106–696, Part 1, on June 23, 2000.

The Committee on Armed Services met to consider H.R. 3906 on May 28. The Committee ordered the bill reported, amended, by Voice Vote, on May 28, and reported the measure to the House with written report, H. Rept. 106–696, Part 2, on July 12, 2000.

Within the Committee on Science, H.R. 3906 was referred to the Subcommittee on Energy and Environment on March 21. Both the Subcommittee and the Full Science Committed were discharged from further consideration of the bill on June 23, 2000.

As introduced, H.R. 3906 establishes an "Office of Independent Security Oversight" within DOE that reports directly to the Secretary of Energy and that is responsible for: (1) the independent evaluation of safeguards and security policies, practices, and programs throughout the DOE (including the NNSA); and (2) the independent evaluation of the effectiveness of classified and unclassified computer security policies and programs throughout DOE (including the NNSA).

The bill also requires that the Office conduct evaluations every 18 months and conduct follow-up reviews to ensure that corrective actions for security problems are effective. The Office is to issue annual reports to Congress before each February 15 summarizing its prior calendar year activities. Subsequently, the Secretary is to issue an annual report to Congress before each March 15 that responds to the Office's annual report that is to include, among other things, "an explanation for any failure on the part of the DOE to complete effectively corrective actions recommended by the Office in its previous annual reports. The Office's Director is also required to issue a "Special Report" immediately to the Secretary and to

Congress whenever the Director "becomes aware of particularly serious or flagrant problems or deficiencies relating to the security programs, practices, or operations of the Department of Energy," and the Secretary is required to respond to Congress within seven calendar days after receiving the Director's Special Report "on the corrective actions taken to address such problems."

Finally, H.R. 3906 prohibits the Secretary from altering, modifying, or otherwise changing the substance of any testimony or briefing to Members or Committees of Congress or their staffs, or from delaying any such testimony or briefing.

2.14—NATIONAL SCIENCE EDUCATION ACT (H.R. 4271)

Background and summary of legislation

H.R. 4271, the National Science Education Act, focuses on improving the science, mathematics, engineering, and technology (SMET) education initiatives of the National Science Foundation (NSF). H.R. 4271 authorizes the National Science Foundation to make grants to schools for various activities, including: (1) SMET master teacher programs in the K–8 grades; (2) partnerships with private industry to encourage students to pursue careers in information technology; (3) dissemination of information to high schools regarding prerequisites to postsecondary SMET education teacher training; (4) teacher technology professional development; and (5) distance learning grants.

H.R. 4271 also authorizes the NSF to provide scholarships to: (1) outstanding teachers to participate in scientific research; and (2) prospective teachers who have majored in science, mathematics, or engineering to fulfill academic requirements necessary to become certified as teachers.

The bill also requires: (1) the Office of Science and Technology Policy to catalog the federal SMET education programs, review and evaluate the programs, develop a plan for interagency coordination, and monitor the plan's implementation; (2) the National Science Foundation and the National Academies of Sciences and Engineering to evaluate studies on the effectiveness of technology in the classroom; and (3) the National Science Foundation to convene a conference to bring together private sector participants in SMET education.

H.R. 4271 was introduced by Mr. Ehlers et al on April 13, 2000, reported by the Committee on Science on September 6, 2000, and discharged by the Committee on Education and the Workforce on September 21, 2000. The House of Representatives took up the bill under suspension of the rules on October 24, 2000. H.R. 4271 failed under suspension of the rules by a vote of 215 yeas to 156 nays.

2.15—ELECTRONIC COMMERCE ENHANCEMENT ACT OF 2000 (H.R. 4429)

Background and summary of legislation

The purpose of H.R. 4429 is to require the Director of the National Institute of Standards and Technology (NIST) to assist small and medium-sized manufacturers to successfully integrate and utilize electronic commerce technologies and business practices, and to authorize NIST to assess critical enterprise integration standards and implementation activities for major manufacturing industries

and to develop a plan for enterprise integration for each major manufacturing industry.

On July 26, 2000, the Committee on Science convened to markup H.R. 4429, The Electronic Commerce Enhancement Act of 2000. A substitute amendment was offered and adopted by voice vote. No additional amendments were offered to the substitute.

With a quorum present, Mr. Hall moved that H.R. 4429, as amended, be reported. The motion was adopted by a voice vote.

On Tuesday, September 26, 2000, H.R. 4429 passed the House under Suspension of the Rules by a voice vote.

2.16—TO DESIGNATE THE MUSEUM OPERATED BY THE SECRETARY OF ENERGY IN OAK RIDGE, TENNESSEE, AS THE AMERICAN MUSEUM OF SCIENCE AND ENERGY, AND FOR OTHER PURPOSES (H.R. 4940)/CONSOLIDATED APPROPRIATIONS ACT, 2001 (H.R. 4577)

Background and summary of legislation

H.R. 4940 was introduced by Representative Zach Wamp (TN–3) on July 24, 2000. The bill was referred to the Committee on Science, and within the Science Committee, it was referred to the Subcommittee on Energy and Environment on August 2. The Subcommittee discharged the bill on September 21, 2000, and by the Committee on October 24.

The House passed H.R. 4940, amended, under suspension of the rules on October 24, 2000, by Voice Vote, and the bill was received in the Senate on October 24, 1999. On October 25, the Senate passed the bill with an amendment by Unanimous Consent.

The House passed H.R. 1733 under suspension of the rules on October 26, 1999, by Voice Vote, and the bill was received in the Senate on October 27, 1999. On November 19, the Senate passed the bill with an amendment by Unanimous Consent. On April 3, 2000, the House agreed to the Senate amendment with an amendment pursuant to H. Res. 453, and passed the bill under suspension of the rules by Voice Vote. On April 13, the Senate agreed to the House amendment to the Senate amendments by Unanimous Consent. The President signed H.R. 1753 into law on May 2, 2000 (Public Law 106–193).

H.R. 4940, as introduced, allows the American Museum of Science and Energy (ASME) in Oak Ridge, Tennessee, to perform functions necessary to its existence, including soliciting donations, distributing information, and collecting fees, in order to cover the costs of the museum. It also authorizes the Secretary of Energy to recruit and train volunteers for the museum. (Under current law, the funds raised by the ASME foundation board would have to be returned to the Treasury and would not be captured for the operations of the Museum. H.R. 4940 is modeled after similar legislation that was passed in the 1992–1993 DOD Authorization bill pertaining to the National Atomic Museum in Albuquerque, New Mexico that the DOE operates.)

The amended version of H.R. 4940 passed by the House contained two titles. Title I is the original text of the bill, as introduced. With the exception of some increased funding for the DOE requested by the Senate, Title II is virtually identical to H.R. 2086, the Networking and Information Technology Research and Devel-

opment Act (NITRD), which was introduced on June 9, 1999, by Science Committee Chairman F. James Sensenbrenner, Jr. (WI–9), and passed by the House, amended, by Voice Vote on February 15, 2000. NITRD amends the High-Performance Computing Act of 1991 and returns the Federal Government's emphasis of information technology (IT) funding to basic research. It authorizes $7.4 billion in appropriations for Fiscal Years 2000 through 2004 for networking and information technology R&D, including Next Generation Internet (NGI), and new NITRD programs at several locations including the National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), DOE, National Institute of Standards and Technology (NIST), NOAA, EPA, and the National Institutes of Health (NIH).

- $4,082.7 million for NSF, including:
  —$155 million for large grants of up to $1 million for high-end computing, software, and networking research;
  —$250 million for information technology research centers;
  —$385 million for terascale computing;
  —$95 million for universities to establish internship programs for research at private companies;
  —$56 million for educational technology research; and
  —$50 million for the NGI program;
- $903 million for DOE (including $30 million for the NGI program);
- $1,048.4 million for NASA (including $20 million for the NGI program);
- $73 million for NIST (including $11 million for the NGI program);
- $71.7 million for NOAA;
- $22.3 million for EPA; and
- $1.2 billion for NIH.

It also establishes a new pool of grant funding at NSF to address issues related to high-end computing, software, social and economic consequences of IT, and network stability, fragility, security (including privacy) and scalability; sets aside $250 million for the establishment of IT centers of six or more researchers entering into multi-disciplinary collaborations for large-scale, long-term basic IT research projects; establishes a $95 million program to award grants to college students (including community college students) to create for-credit IT industry internships programs at two and four year colleges; and authorizes NSF to administer a new $385 million program for combined terascale computing acquisition.

H.R. 4940 became Title IV of H.R. 5666, A bill making miscellaneous appropriations for fiscal year ending September 30, 2001, which was incorporated in H. Rept. 106–1033, the conference report on H.R. 4577, Consolidated Appropriations Act, 2001. The House and Senate agreed to the conference report on December 15, 2000—clearing the measure for the President.

CHAPTER III—COMMEMORATIVE RESOLUTIONS DISCHARGED BY THE COMMITTEE ON SCIENCE

3.1—H.RES. 267, EXPRESSING THE SENSE OF THE HOUSE OF REPRESENTATIVES WITH REGARD TO SHUTTLE MISSION STS–93, COMMANDED BY COL. EILEEN COLLINS, THE FIRST FEMALE SPACE SHUTTLE COMMANDER

Background and summary of legislation

A Space Shuttle mission, STS–93, was launched on July 22, 1999 to deploy the Chandra X-Ray Telescope with Colonel Eileen Collins (USAF) in command, the first shuttle mission ever commanded by a woman. The resolution congratulates the crew of Shuttle Mission STS–93 and honors Colonel Collins on being the first female commander of a United States space shuttle; recognizes the important contribution Colonel Collins has made to the United States space program and to the advancement of women in science; and invites Colonel Collins and the crew of STS–93 to the United States Capitol to be honored and recognized by the House of Representatives for their achievements.

The resolution was introduced on July 27, 1999, the day STS–93 returned to Earth, by Representative Constance Morella and referred to the Committee on Science. It eventually acquired eight cosponsors.

The House considered the resolution on August 2, 1999 under suspension of the rules. The House of Representatives adopted the measure on a voice vote on August 2, 1999.

CHAPTER IV—OVERSIGHT, INVESTIGATIONS AND OTHER ACTIVITIES OF THE COMMITTEE ON SCIENCE, INCLUDING SELECTED SUBCOMMITTEE LEGISLATIVE ACTIVITIES

4.1—COMMITTEE ON SCIENCE

4.1(a)—The Year 2000 Problem: Status Report on the Federal, State, Local, and Foreign Governments

January 20, 1999

Hearing Volume No. 106–42

Background

On January 20, 2000 the Committee held a hearing entitled, "The Year 2000 Problem: Status Report On The Federal, State, Local, And Foreign Governments." The hearing presented John Koskinen with the opportunity to report to the House on the status of the Executive Branch's Year 2000 efforts. He also provided an assessment of the council's work with State and local governments, as well as its work with foreign nations. In addition, the committee received testimony from the National Intelligence Council which, along with representatives of the Central Intelligence Agency, provided a declassified assessment of the status of Year 2000 efforts among foreign governments. A representative of the U.S. General Accounting Office also reported on the issue.

Witnesses included: Mr. John Koskinen, Chairman, President's Council on the Year 2000 Conversion; Dr. Lawrence K. Gershwin, Ph.D., National Intelligence Officer for Science and Technology, National Intelligence Council accompanied by Norman Green, Deputy National Intelligence Officer for Science and Technology, National Intelligence Council; and Mr. Joel Willemssen, Director, Accounting and Information Management Division, General Accounting Office.

Summary of hearing

Mr. John Koskinen, Chairman, President's Council on the Year 2000 Conversion, stated that, "According to the most recent OMB report released last month, 61% of all Federal mission-critical systems are now Y2K compliant-more than double the 27% compliant a year ago. These systems have been tested and implemented and will be able to accurately process data through the transition from 1999 into the Year 2000. The report also states that, of critical systems requiring repair work, 90% have been fixed and are now being tested." The President has established an ambitious goal of having 100% of government's mission-critical systems Y2K compliant by March 31, 1999—well ahead of any private sector system remediation schedules. Although much work remains, we expect that over 80% of the Government's mission-critical systems will meet

the March goal, and monthly benchmarks with a timetable for completing the work will be available for every system still being tested or implemented.

Mr. Koskinen expects that all of the Government's critical systems will be Y2K compliant before January 1, 2000." States administer over 160 Federal programs—that is, Unemployment Insurance, Medicaid, and Food Stamps. Generally, most States are making good progress in remediating their systems. A handful of States report that they have not yet completed their critical systems. Mr. Koskinen is increasingly confident that there will be no large-scale national disruptions in key infrastructure areas, in particular, telecommunications and electric power. Banks are well prepared—96% of the Nation's depository institutions are on track to meet regulators goal of completing Y2K work by June 1999.

Furthermore, Mr. Koskinen claimed that smaller government entities and small businesses are at greatest risk of having Y2K problems. Mr. Koskinen believes it necessary to provide the public with clear and candid information about the status of Year 2000 activities at the Federal, State, local levels and the private sector.

Dr. Lawrence K. Gershwin, Ph.D., National Intelligence Officer for Science and Technology, National Intelligence Council accompanied by Norman Green, Deputy National Intelligence Officer for Science and Technology, National Intelligence Council testified that the Y2k situation is very fluid, his assessments could change significantly over the next several months as more information becomes available. The Gartner Group estimates global expenditures could be about one to two trillion dollars. "Governments in many countries have begun to plan seriously for Y2K remediation only within the last year, some only in the last few months, and some continue to significantly underestimate the cost and time requirements for remediation and, more importantly, testing. Because so many countries are way behind, testing of fixes will come late, and unanticipated problems typically arise in that phase." Larger institutions, particularly in the financial sectors, are most advanced in Y2K remediation; small and medium-size entities trail in every sector worldwide.

Dr. Gershwin also stated that most countries have failed to address the embedded processor issue. The lowest level of preparedness is evident in Eastern Europe, Russia, Latin America, the Middle East, Africa and several Asian countries, including China. Widespread Y2K failures in the Winter of 1999–2000 in Russia and Ukraine could have major humanitarian consequences. Concerns include problems with computer-controlled systems and subsystems within power distribution systems and nuclear power generation stations leading to reactor shutdowns. "While the lines of authority for China's Y2K effort have been established, its late start in addressing Y2K issues suggests Beijing will fail to solve many of its Y2K problems in the limited time remaining, and will probably experience failures in key sectors such as telecommunications, electric power, and banking." Dr. Gershwin does not see a problem in terms of Russian or Chinese missiles automatically being launched or nuclear weapons going off due to Y2K failures.

Dr. Gershwin adds that, "Significant oil exporters to the United States and the global market include a number of countries—Ven-

ezuela, Saudi Arabia, Mexico, Nigeria, Angola, and Gabon—that are lagging in their Y2K failures." Multi-national corporations in oil-producing countries are highly dependent on ports, ocean shipping, and domestic infrastructures. "Foreign officials and companies are looking to the West, particularly, the United States for help." Thus, worldwide litigation issues are already part of the Y2K scene.

Mr. Joel Willemssen, Director, Accounting and Information Management Division, General Accounting Office stated that, "As of mid-November 1998, four of the twenty-four major departments and agencies (17%) reported that they had not completed assessing their mission-critical systems to be repaired—over a year behind OMB's government-wide target of June, 1997; 16 of the 24 major departments and agencies (67%) reported that they had not completed renovating their mission-critical systems to be repaired—several weeks after OMB's government-wide deadline of September 1998; and, 6 of the 24 major departments and agencies (25%) reported that they had validated 50% or fewer of their mission-critical systems to be repaired. OMB's government-wide target to complete validation is January 1999." As of November 1998, many agencies had not competed inventorying and or assessing their telecommunications or embedded systems.

In addition, reviews show uneven Federal agency progress. Recommendations have centered on project planning, priority setting, data exchanges, testing and business continuity and contingency planning. According to OMB, all agencies are required to independently verify their validation process to provide a check that their mission-critical systems will be ready for year 2000. He recommends that the President's Council continue to aggressively pursue readiness information in areas in which it is lacking, that is, the railroad industry, health sector and local law enforcement. The Council may want to consider legislative remedies such as requiring disclosure of Year 2000 readiness data should the use of associations to voluntarily collect information not yield necessary information. The Council should also consider requesting that national associations publicly disclose companies that have responded to surveys. The Council could prioritize trade and commerce activities critical to the nation's well-being, that is, oil, food, pharmaceuticals, as well as identify options to be obtain through alternative avenues.

4.1(b)—Why and How You Should Learn Math and Science

March 17, 1999

Hearing Volume No. 106–21

Background

On Wednesday, March 17, 1999 at 10:00 a.m., the Science Committee held a hearing on the importance of science and math education from preschool through high school, and how it can be improved. This was the first in a series of hearings on science and math education issues to be conducted by the Committee during the 106th Congress. The Committee is planning a comprehensive examination of current science and math education, the future of

science and math education, and reforms that may be necessary to ensure graduates are well prepared to be productive members of American society. The purpose of this first hearing was to discuss the directions in which science and math education may be heading in the next century, to develop a general understanding of why there is an increasing need for competent science and math education, and to help identify what needs to be undertaken to ensure that American students have the background to be competent employees in the workplace, smart consumers in the marketplace, and contributing citizens of our nation in the 21st Century.

Witnesses before the Committee included: Dr. Vera Rubin, Member, National Science Board; Dr. Rodger Bybee, Executive Director and Dr. Joan Ferrini-Mundy, Associate Executive Director, Center for Science, Math and Engineering Education; Amy Kaslow, Senior Fellow, Council on Competitiveness; Dr. Shirley Malcom, American Association for the Advancement of Science; and John Harrison, CEO, Ecutel.

Summary of hearing

Dr. Rubin opened her testimony by reviewing "Preparing our Children: Math and Science Education in the National Interest," a report recently released by the National Science Board, which is the result of a year-long study of the disappointing TIMSS results. Because of the high incidence of students changing schools, the report concludes that it is imperative to develop national strategies to improve K–12 teaching and learning of math and science. Three areas of particular importance to improving education are: (1) a consensus on content for each grade level, with instructional materials that promote thinking and problem-solving and creatively use technology; (2) widely-shared standards in teacher preparation, licensing, and professional development; and (3) an increased congruence between high school graduation requirements and undergraduate performance demands. She concluded her testimony by adding that research into each of these areas should be the basis for reform.

Dr. Bybee opened his testimony by stating the importance of learning the abilities of scientific inquiry. These skills help students learn other disciplines. The skills include identifying questions that guide an investigation; designing and conducting an investigation; gathering and analyzing data; developing descriptions, explanations and predictions using evidence; thinking critically and logically to establish a relationship between evidence and an explanation; and communicating procedures and explanations. He continued that the first thing to do to be sure that students learn these skills is to teach them through "hands-on" methods. He stated that this education is possible only with curriculum materials that emphasize the abilities of scientific inquiry and teachers, who possess, understand and implement these abilities. Dr. Bybee concluded by emphasizing the need for public support for teaching science as inquiry as a valued goal.

Dr. Ferrini-Mundy opened her testimony by adding the skills learned through mathematics also benefit students in areas outside of this discipline. She stated that mathematics calls for students to pose questions; to collect, organize and represent data to answer

those questions; to interpret data; and to develop and evaluate inferences and predictions. Mathematics teaches students to reason; to communicate unambiguously; to assess claims; to detect fallacies; to evaluate risks; and to analyze evidence. She concluded her testimony by stating that we need research into the learning of math and science that focuses on particular curricular and teaching approaches. Finally, she stated that we need research about teacher learning and development.

Ms. Kaslow opened her testimony by explaining that her remarks are based on a Council project that examined what happens when the K–12 education system fails to deliver on the basics. She testified that the United States' workforce is experiencing an acute skills shortage and that many prospective and existing workers do not have the skills necessary for the jobs being created. Without a significant boost in the quality of math and science education, Ms. Kaslow concluded, American workers will not be able to become competitive in the international economy.

Dr. Malcom opened her testimony by stating that advanced scientific quantitative and technical skills have become indispensable not just in technologically-related jobs, but also in many other areas of the workforce and in society in general. Society has been revolutionized so that everyday living requires the skills, knowledge and understanding commensurate with a math and science education. Dr. Malcom closed her testimony by stating that because the majority of the U.S. population is beyond the educational system, it is not just improving schools that is necessary, but also relying on media and other avenues to relay needed information.

Mr. Harrison opened his testimony by stating that a lack of stringent math and science education is contributing to many American job applicants being unqualified for positions with Ecutel and like technology companies. He described the situation being faced by Ecutel in illustrating a national problem: American applicants without competitive skills; positions unfilled or filled by foreign workers; and, subsequently, funds diverted from investment, marketing and job creation to immigration fees for foreign workers, thereby allowing Ecutel to make much less of an impact on the economy than it otherwise could. He concluded his testimony by emphasizing the need for improving the quality of math and science education.

4.1(c)—K–12 Math and Science Education: What Is Being Done To Improve It?

April 28, 1999

Hearing Volume No. 106–34

Background

On Wednesday, April 28, 1999 at 9:30 a.m., the Committee on Science held a hearing to survey current K–12 math and science curricular programs. This was the second in a series of hearings on science and mathematics education issues being conducted by the Committee during the 106th Congress. The purpose of this second hearing was to determine what curricular programs are currently available through the Federal Government and private organiza-

tions to school districts and teachers; which programs are being utilized; which ones have proven successful and why; what teaching methods associated with the various curricular programs are effectual, and the degree of impact teacher training has upon the success of individual programs. In addition, the hearing examined what level of coordination between various agencies of the Federal government is standard practice. Finally, it also looked at the current and future goals of the agencies and other program sponsors.

Witnesses before the Committee included: The Honorable Rita Colwell, Director, National Science Foundation; Ms. Judith Johnson, Acting Assistant Secretary, Office of Elementary and Secondary Education, Department of Education; The Honorable Daniel Goldin, Administrator, NASA; Dr. Gerry Wheeler, Executive Director, National Science Teachers Association; Mr. Gordon Ambach, Executive Director, Council of Chief State School Officers.

Summary of the hearing

Dr. Colwell opened her testimony by explaining the central concepts of NSF education programs. First, partnerships that pull in all stakeholders are vital to the success of any education program. Secondly, NSF seeks quality for education programs, which is ensured through such means as peer-review. Dr. Colwell also testified to the priorities within NSF for the future of education programs. The first priority is building better links with NSF research programs in K–12 education. Next, she indicated that NSF hopes to promote new strategies and collaborations for teacher preparation. Finally, NSF is prioritizing increased emphasis on research into learning. She concluded her testimony by stating that closer ties in the future between science and education agencies will lead to opportunities to improve K–12 math and science education.

Ms. Johnson opened her testimony by explaining that the TIMSS results have disclosed that students who have well-trained teachers and content-rich curricula can demonstrate high levels of achievement. She continued by emphasizing three key principles of the Department of Education's efforts in math and science education. First, challenging curricula should be encouraged for all children and the DoEd is disseminating information on education resources via the Internet. Secondly, high-quality teaching should be supported. Finally, a research and evaluation database should be built. She ended her testimony by concluding that a high quality education in math and science is the means to young people reaching their potential.

Mr. Goldin opened his testimony by emphasizing the critical nature of educational success to the future. To these ends, NASA both directly funds education programs and is beginning to embed education in all NASA programs. As an example, Mr. Goldin relayed the story of a child who was transformed from a gang member to a college hopeful through participation in a science competition. He concluded his testimony by expressing his frustration at the funding cutbacks that are preventing more emphasis on education programs.

Dr. Wheeler opened his testimony by explaining that there are numerous supplementary curriculum programs, but very few yearlong programs in K–12 science education. He commented that most

of these programs were created before the release of standards, thus presenting a challenge to the implementation of such standards. He testified that several groups are producing curriculum materials: professional societies and other non-profit groups, federal agencies, and the states through the utilization of textbooks as the base for teaching science. Dr. Wheeler concluded his testimony by emphasizing the need for support for teachers, including classroom materials and professional development.

Mr. Ambach opened his testimony by summarizing several education indicators—from the increased percentage of students taking math and science courses to the percentage of teachers teaching out of certified area—that are included within the status materials on math and science education collected by the Council. He continued by explaining that students in states that are approaching reform systemically are scoring higher on tests. Mr. Ambach pointed out four approaches the federal government could be taking with regard to science and math education: funding standards and assessments; funding for measurement tests, such as TIMSS; funding technology used both for instruction and distance learning; and supporting professional development. He concluded by stating that the states do not fear strong federal intervention in the case of directing funds to math and science.

4.1(d)—Security at the Department of Energy: Who's Protecting the Nation's Secrets?

May 20, 1999

Hearing Volume No. 106–9

Background

On Thursday, May 20, 1999 the Committee on Science held a hearing entitled, "Hearing on Security at the Department of Energy: Who's Protecting The Nation's Secrets?" to hear testimony on security lapses at the Department of Energy resulting in the possible theft of nuclear secrets. A recent FBI investigation uncovered instances of alleged espionage by a scientist employed at the Los Alamos National Lab. This is the fourth public case in the past two decades of Chinese espionage at Department of Energy (DOE) labs. In addition, the Committee discussed a reform package that the DOE put forward to address security concerns.

The lone witness for this hearing was the Honorable Bill Richardson, Secretary, U.S. DOE. He was accompanied by the Honorable Ernest J. Moniz, DOE Under Secretary, and Mr. Edward J. Curran, Director, DOE Office of Counterintelligence.

Summary of hearing

Secretary Richardson testified on many of the 86 reforms he had initiated at DOE's national laboratories, counterintelligence, and the overall complex. He said that security problems arose because security operations at the Department were splintered, there was a lack of accountability, and the lab culture was not monitored. The Secretary proposed creating a new "Office of Security and Emergency Operations," which would report directly to the Secretary and would bring all security operations under one roof. Addition-

ally, the Secretary's plan would impose a zero-tolerance security policy, open the DOE up to scrutiny from independent boards, and implement a cybersecurity program. Mr. Richardson also testified to the following in response to questions from Members:

- A lack of communication is cited as the reason that the Administration waited three years after learning of the scientist's activities before they decided to take action to strengthen security.
- DOE has moved to a 100-percent background check policy on scientists from sensitive countries and many people have been rejected. DOE rejects scientists if anything suspicious is found in the background check.
- Mr. Richardson briefed the President continuously since taking office in September 1998. The President's March 19, 1999 response to a question concerning espionage at DOE in which he said, "I can tell you that no one has reported to me that they suspect such a thing has occurred," referred specifically to a legal case against someone.
- The Secretary supports legislation calling for a moratorium on lab visits by citizens of sensitive countries, but does not want the language to be drafted broadly so as to prevent work that is currently going on in unclassified labs. This moratorium could be lifted once the FBI and CIA determine that sufficient security is in place.

4.1(e)—K–12 Math and Science Education—Finding, Training and Keeping Good Teachers

June 10, 1999

Hearing Volume No. 106–63

Background

On Thursday, June 10, 1998, the Committee on Science and the Committee on Education and the Workforce held a joint hearing to examine issues related to K–12 mathematics and science teachers, including recruitment, pre-service training, professional development, and retention. This was the third in a series of hearings on science and mathematics education issues being conducted by the Committee on Science during the 106th Congress. The purpose of this third hearing was to determine problems and strengths in the U.S. educational systems that impact securing the best teachers in every mathematics and science classroom. Among those areas explored were the recruitment and training of future teachers, professional development for teachers and retention of current teachers.

Witnesses appearing before the Committees included: Dr. John Staver, Director of the Center for Science Education, President of the Association for Education of Teachers of Science and Professor at Kansas State University; Mr. Howard Voss, Chairman of the Physics Department at Arizona State University; Dr. Jane Kahle, Condit Professor of Science Education, Miami University of Ohio; and Ms. Pamela B. Tackett, Executive Director, Texas State Board for Educator Certification.

Summary of the hearing

Mr. Voss opened his testimony by stating that about two million K–12 teachers will have to be recruited by 2007. He explained that most teachers are recruited while they are young students and that, given the impending timeframe in which these teachers will be needed, nothing short of a societal change will allow this number of teachers to be added to the teaching force. Mr. Voss listed the reasons for the teacher shortage: low salaries, lack of societal regard, and improper secondary education. He described strategies for adding mathematics and science teachers into the profession: ensuring enthusiastic elementary and high school teachers who will excite in their students an interest in teaching science and mathematics, and reforming college programs to make them conducive to choosing teaching as a career. Finally, he stated that one of the most important strategies for keeping teachers is to treat them as professionals.

Dr. Staver opened his testimony by stating that teachers need expertise in four areas: science, teaching, learning and the setting in which they plan to teach. He explained that effective teacher training programs must teach all four. In addition, good programs relate the subject areas to students' interests, community concerns and societal issues, while getting students involved in action research. Finally, good programs promote teaching as a profession by providing opportunities for experienced teachers. He stressed the effectiveness of professional development schools (PDSs), which are schools working in partnership with universities. He closed his testimony by cautioning that alternative routes to teacher certification may bypass much of the instruction needed to fully prepare teachers.

Dr. Kahle opened her testimony by describing past professional development efforts as short-term, standardized sessions designed to impart specific skills. She explained that such activities usually do not result in the improved content knowledge necessary to change teachers' practices or enhance student learning. Rather, she asserted, evidence is concluding that professional development should include cooperative groups, open-ended questioning, extended inquiry, problem-solving, leadership opportunities and model strategies. It should be sustained, content-based and use new teaching strategies. In addition, professional development should provide time for teachers to reflect on what they have learned. It should include ongoing assessments, incentives, graduate credit, and should be tied to career goals. Finally, it should be accountable. Dr. Kahle explained that teaching practice directly impacts student achievement, as has been demonstrated by statewide reform programs, including Systemic Initiatives.

Ms. Tackett opened her testimony by confirming that there is a growing need for teachers, especially those qualified to teach math and science. To address this challenge, the State of Texas is adopting several approaches. First, programs to motivate students interested in science to become science teachers are being initiated at state universities. Secondly, the universities have gotten legislative encouragement. Thirdly, the State has submitted a proposal for a federal grant that would establish mentor training, which, she stated, has proven effective in teacher retention efforts. Finally, to

combat unpreparedness as a reason beginning teachers leave the profession, the State is requiring schools of education to meet new State standards.

4.1(f)—The Rudman Report on Security Problems at the Department of Energy

June 29, 1999

Hearing Volume No. 106–31

Background

On Tuesday, June 29, 1999, the Committee on Science held a hearing entitled, "The Rudman Report on Security Problems at the U.S. Department of Energy," to hear testimony on the report published by the President's Foreign Intelligence Advisory Board (PFIAB) entitled, "Science at its Best, Security at its Worst: A Report on Security Problems at the U.S. Department of Energy."

Beginning in January and escalating in March of 1999, a series of press reports revealed that employees at the Los Alamos National Laboratory may have provided classified information to China. On March 18, 1999, President Clinton asked PFIAB to "undertake a review of the security threat at the Department of Energy's (DOE) weapons labs and the adequacy of the measures that have been taken to address it." The President also asked PFIAB "to deliver its completed report to the Congress, and to the fullest extent possible consistent with our national security, to release an unclassified version to the public." A Special Investigative Panel of PFIAB spent three months reviewing more than 700 reports and studies and thousands of pages of classified and unclassified documents, interviewing over 100 witnesses, and visiting several of the DOE labs.

The sole witness for the hearing was the Honorable Warren B. Rudman, Chairman, President's Foreign Intelligence Advisory Board.

Summary of hearing

Mr. Rudman discussed the findings in the report as follows:

- In the past 20 years there have been over 100 reports issued on security at DOE labs including 29 GAO reports, 61 internal DOE reports, and 12 reports conducted by special task forces and ad hoc panels.
- PFIAB recommends that the management structure at DOE Nuclear Weapons Labs be fundamentally restructured in favor of a system of management that holds each person at the lab responsible and accountable for security.
- The science at the DOE labs is perhaps the best in the world, and the PFIAB report should not be construed as a criticism of these scientific programs, nor does PFIAB propose anything that would undermine their effectiveness.
- One of the major problems that has led to security breaches at DOE is the overlapping and competing lines of authority that lead to a reduced level of accountability by employees for their mistakes.
- PFIAB believes that creating a semi-autonomous agency within DOE that deals with classified nuclear programs would actually

grant more power to the Secretary in that the locus of responsibility would be more clearly defined. Moreover, a semi-autonomous agency would not hamper important scientific programs conducted at DOE.

• While PFIAB does not advocate placing civilian labs under the jurisdiction of the semi-autonomous agency, it does support moving classified programs within the civilian labs to other labs that are covered by the semi-autonomous agency if DOE proves that security is a problem in the civilian labs as well.

• A security stand-down was ordered for three DOE labs and some twenty percent of the employees failed to show up for it. Senator Rudman explained that this is an example of the culture of arrogance at DOE.

• PFIAB was unanimous in deciding that moving the weapons labs to the Department of Defense (DOD) was a bad idea. Reasons cited for this decision included DOD's inability to handle another complex lab and the potential to lose scientists if the weapon's labs were put under DOD's jurisdiction.

4.1(g)—K–12 Math and Science Education—Testing and Licensing Teachers

August 4, 1999

Hearing Volume No. 106–64

Background

On Wednesday, August 4, 1999, the Committee on Science held a hearing to examine issues related to K–12 mathematics and science teachers, including recruitment, pre-service training, professional development, and retention. This was the third in a series of hearings on science and mathematics education issues being conducted by the Committee on Science during the 106th Congress. The purpose of this third hearing was to determine problems and strengths in the U.S. educational systems that impact securing the best teachers in every mathematics and science classroom. Among those areas explored were the recruitment and training of future teachers, professional development for teachers and retention of current teachers.

Witnesses appearing before the Committees included: Dr. Marci Kanstoroom, Research Director, Thomas B. Fordham Foundation; Dr. Mari Pearlman, Vice President, Teaching and Learning Division, Educational Testing Service; Ms. Patte Barth, Senior Associate, The Education Trust.

Summary of hearing

Dr. Pearlman opened her testimony by explaining that the purpose of licensing tests is to provide a standard by which States can determine who has sufficient knowledge to be qualified to receive a teaching license. She further clarified that such tests are not meant to be able to predict who will be an excellent teacher. She continued by examining validity and fairness issues and explained the test development process that is used to ensure validity and fairness. She concluded by calling attention to ETS's recently released study on the academic quality of prospective teachers.

Ms. Barth began by explaining that States' attempts to raise standards for students have been limited by inadequately prepared teachers. She continued with a summary of The Education Trust's studies, including that State licensing requirements place more emphasis on pedagogical knowledge as opposed to content and do not test at a high enough level. She also addressed concerns that higher standards mean fewer minority teachers by stressing that minority students can do as well on tests if they are taught to high standards. Ms. Barth concluded by adding her support for maintaining teacher licensure within the States' purview, but also by agreeing with the Administration that content area tests should be given to all prospective teachers.

Dr. Kanstoroom opened her testimony by explaining that the current licensing systems are not able to ensure both the quantity and quality of teachers needed in the classroom. She continued that content knowledge is a primary factor in determining a good teacher. She explained that alternative certification often attracts those with expertise in content, such as math and science, as opposed to an educational foundation in pedagogy. Although such certification may result in increasing the quantity of quality teachers, not every State offers an alternative route to teacher certification. Dr. Kanstoroom also noted that uniform teacher salaries inhibit schools' ability to hire teachers with science and math expertise. She concluded by offering suggestions for improvement: expand alternative certification options, allow teacher pay to respond to market place conditions and require teachers to have degrees in the subject matter they teach.

4.1(h)—EPA's Sludge Rule: Closed Minds or Open Debate

March 22, 2000

Hearing Volume No. 106–95

Background

On March 22, 2000 the Committee on Science held a hearing entitled EPA's Sludge Rule: Closed Minds or Open Debate? This hearing examined whether the EPA, in its development and enforcement of the Part 503 Sludge Rule, failed to foster sound science with an open exchange of ideas and information between scientists, EPA officials, and private citizens. The hearing explored allegations that EPA scientists who disagree with EPA's science associated with the sludge rule, were ignored, or worse, subjected to harassment. Even more disturbing are documented reports of intimidation directed at private citizens who express concerns about EPA sludge policies and the science behind those policies. Researchers, scientists, their representatives and private citizens testified regarding EPA's response to concerns raised about the science associated with the Part 503 Sludge Rule.

Witnesses included: J. Charles Fox, Assistant Administrator, Office of Water, U.S. Environmental Protection Agency; Stephen M. Kohn, Chairman of the Board of Directors of the National Whistleblower Center; Ellen Harrison, Director, Cornell Waste Management Institute, Cornell University, New York; Mr. Cecil Lue-Hing, Former Director of Research and Development, Metropolitan Water

Reclamation District of Greater Chicago; and Jane Beswick, a California farmer.

Summary of hearing

Mr. Fox discussed the background of the 503 Sludge Rule and the improvements in sewage treatment over the past 30 years. In addition he defended the EPA's record of public and scientific input in the decision making process, making the following key points:

- Eight million dry metric tons of biosolids (sludge) are produced annually and 54 percent are disposed of through land application.
- Section 405(g) of the Clean Water Act authorizes the EPA to promote the safe and beneficial management of biosolids.
- Part 503 is a risk-based rule that establishes limits on the concentrations of pollutants (including heavy metals) and pathogens in sludge, as well as guidelines for its land application.
- The development of Part 503 began in 1984 at an EPA-sponsored workshop and culminated in 1989 into a proposal that included a commitment to continue peer review.
- In 1996 the National Academy of Sciences issued a report that confirmed that properly managed and applied sludge was safe for use in food crop production.

Mr. Kohn testified about the harassment and illegal termination, by the EPA, of scientists who disagreed with the Part 503 sludge rule. In particular, he talked about the cases of Dr. David Lewis and Dr. William Marcus. In addition, he detailed the agency's lack of a whistleblower protection policy. Some of his key points were:

- In October 1999, Dr. Lewis co-authored, along with numerous prominent scientists, an article concerning pathogens in sludge applied in accordance with the Part 503 Rule.
- Joseph C. Cocalis, industrial hygienist for the Centers for Disease Control, later testified that these concerns were justified and characterized the EPA's position as, "indefensible from a public health standpoint."
- EPA publicly criticized Dr. Lewis and accused him of violating the Hatch Act, charges they later admitted were baseless.
- The EPA supervisors responsible for the retaliation and misconduct in whistleblower cases were never disciplined.
- Despite a court order, the EPA has yet to implement a whistleblower protection policy.

Ms. Harrison raised concerns about the dangers of groundwater contamination associated with the land application of biosolids, and EPA's failure to adequately address these concerns. In addition, she questioned the EPA's commitment to an open peer-review process, and accused them of improperly distributing research funds. Key points of her testimony included:

- Cornell researchers, teamed with 27 other scientists, have suggested limits on land application much stricter than the Part 503 Rule.
- Of particular concern to these, and other researchers was groundwater contamination from sludge leaching in areas of New York with acidic soils and shallow water tables.
- The EPA attempted to discredit these studies by suggesting that the research methods were inappropriate, even though one of their own representatives sat on the project's advisory board.

• The EPA sent letters to the New York State Department of Environmental Conservation discouraging them from adopting standards more stringent than the Part 503 Rule.

Dr. Cecil Lue-Hing defended the land application of sludge, and the scientific integrity of the Part 503 Rule. He testified that biosolids were a safe and effective source of fertilizer when applied according to the Part 503 Rule. His key points were:

• There has never been any documented illness associated with the land application of properly treated sludge.

• According to a 1985 study of 47 Ohio farms using biosolids, there was no observed link between the land application of sludge and disease occurrence in domestic animals.

• The Land Practices Peer Review Committee—a diverse group of scientists, government officials, attorneys, environmental activists, and other stakeholders—worked with the EPA to provide an extensive peer review of the sludge rule.

• During this peer review, 5,500 pages of comments from 656 participants were received.

• The resulting Part 503 Rule accomplished the goals of recycling roughly 5 million tons of biosolids each year, while protecting the health of people and the environment.

Ms. Jane Beswick, a California dairy farmer and coordinator of the Coalition for Sludge Education described the harassment and intimidation she allegedly received from Dr. Rubin of the EPA. This aggravation began after her paper, "Some Misconceptions Concerning Sludge" was published in 1996, and consisted of ten unsolicited mailings.

• The letters from Dr. Rubin began as objections to two items in her paper. The first issue concerned landowner liability, and the second concerned her distinctions between manure and sludge.

• She testified that Dr. Rubin warned that her continued focus on the dangers of sludge would eventually "focus . . . the regulators' attention on . . . the use of manures."

• This pattern continued; as she became more active she received more letters. All the letters contained antagonistic language, and warned of future regulations on manure.

• Some of the mailings were official correspondence from the EPA regarding animal manure and biosolids.

• The ninth mailing was ominous handwritten message reading, "Manure = miscarriages or baby deaths. The bell is tolling!"

4.1(i)—NASA's Mars Program After the Young Report, Part 1

April 12, 2000

Hearing Volume No. 106–96

Background

On April 12, 2000, the Committee on Science held a hearing on NASA's Mars program in the context of the Mars Program Independent Assessment Team's (MPIAT) report released on March 14, 2000. In 1999, all three of NASA's most recent missions to Mars ended in failure. As a result, a number of panels, including the MPIAT, were convened to look into the reasons behind the failures and report their findings and recommendations.

Witnesses included: Mr. Tom Young, retired Executive Vice President of Lockheed Martin, Inc., and Chairman of the Mars Program Independent Assessment Team; and Mr. John Casani, retired Project Manager at the Jet Propulsion Laboratory (JPL) at the California Institute of Technology and Chairman of the JPL Special Review Board that investigated the Mars mission failures.

Summary of hearing

Mr. Young presented the MPIAT's findings and recommendations regarding the failed Mars missions and NASA's overall Mars program.

Mr. Casani presented the Special Review Board's findings on the likely reasons behind the Mars mission failures and the panel's recommendations.

4.1(j)—Science, Math, Engineering and Technology Education in Kindergarten through 12th Grade: H.R. 4271, The National Science Education Act

May 17, 2000

Hearing Volume No. 106–82

Background

On May 17, 2000 the Committee on Science held a hearing entitled "A Plan to Renew Science, Math, Engineering and Technology Education in Kindergarten through 12th Grade: H.R. 4271, The National Science Education Act." This was the first in a series of hearings to examine certain programs under the jurisdiction of the Department of Education (DoEd) that impact or address science, mathematics, engineering and technology (SMET) education and the "National Science Education Act" (H.R. 4271), introduced by Representative Vernon J. Ehlers (MI). The bill would establish and expand programs relating to SMET education for students in kindergarten through 12th grade. H.R. 4271 focuses on two primary components of quality education: opportunities for all students and assistance for teachers.

Witnesses included: Mr. Jeffrey Leaf, Vice President of the Board on Pre-College Education for ASME and teacher at Thomas Jefferson High School for Science and Technology; Mr. Benjamin Boerkoel, Director of Curriculum and Staff Development, Grand Rapids Christian Schools; Mr. John Boidock, Vice President for Government Relations, Texas Instruments.

Summary of hearing

Mr. Jeffrey Leaf identified improvements of science, math, engineering and technology education as being one of the most important public policy issues and noted the following in his testimony:

- Educational software should encourage critical thinking and problem solving.
- Working groups are very important because they provide a forum for ideas on curriculum and teaching methods.
- A program of distance learning that stresses innovation would help alleviate the shortage of qualified technology teachers.

• Master teachers should be used to mentor new teachers, while master aides help with set up and maintenance of equipment.

Mr. Boerkoel discussed the implications of H.R. 4271 for improving teacher training and curriculum improvement, and made the following observations:

• Many new teachers have a less than enthusiastic view of math and science; their inadequate training plays a large role in this.

• Providing grant money to recruit and hire Master Teachers with strong backgrounds and interest in math, science, and technology is invaluable to professional development.

• Increasing teacher participation in curriculum development through scholarships, working groups, and training is important.

• Rural educational opportunities need to be enhanced through distance learning components.

• Organizing and maintaining a link to private sector funds and expertise help all students, especially the economically disadvantaged, by providing the cutting edge materials and personal relationships.

Mr. John Boidock spoke convincingly about the need to improve math, science, and technology education for the health of our economy.

• The acute shortage of engineers and technology workers is due to a variety of factors including a shrinking pool of students graduating with the skills needed for these jobs.

• The number of bachelors degrees awarded in electrical engineering since 1987 has declined steadily, falling 46 percent.

• To reverse this trend and maintain America's technological supremacy, our schools must produce more students with strong math, science and technology skills.

• Companies need to take an active role in our schools by ensuring that kids learn what they need to succeed in a technology and information-rich society.

4.1(k)—Science, Math, Engineering and Technology Education in Kindergarten Through 12th Grade, and H.R. 4272, National Science Education Enhancement Act

June 13, 2000

Hearing Volume No. 106–82

Background

On June 13, 2000 the Committee on Science held a hearing entitled "Hearing on Reviewing Science, Math, Engineering and Technology Education in Kindergarten Through 12th Grade, and H.R. 4272, The National Science Education Enhancement Act." This was the second in a series of hearings to examine certain programs under the jurisdiction of the Department of Education (DoEd) that impact or address science, mathematics, engineering and technology (SMET) education and the "National Science Education Enhancement Act" (H.R. 4272), introduced by Representative Vernon J. Ehlers (MI). The bill would establish and expand programs, many at the DoEd, relating to SMET education for students in kindergarten through 12th grade. Like its companion bills, H.R. 4272

focuses on two primary components of quality education: opportunities for all students and assistance for teachers.

Witnesses included: Dr. Len Simutis, Director of the Eisenhower National Clearinghouse for Mathematics and Science Education at The Ohio State University; Dr. Diane M. Bunce, Associate Professor, Chemistry Department, Catholic University of America; Dr. Audrey Champagne, Professor of Chemistry & Science Education, Department of Educational Theory & Practice, State University of New York at Albany; Dr. Janice M. Gruendel, Executive Director, Connecticut Voices for Children.

Summary of hearing

Dr. Simutis explained how the Eisenhower National Clearinghouse will continue to expand its mission under H.R. 4272.

- H. R. 4272 would increase the products and services that Eisenhower National Clearinghouse (ENC) would be able to provide to educators across the nation. The legislation would also expand the ENC to include K–12 engineering and technology education.
- A better evaluation of curriculum resources, particularly those which are technology-based, is needed.
- Programs such as ENC's Consortia would help deliver expert, research-based advice to teachers, schools, and states on how to improve their math and science programs. With its economies of scale for expert staff and programs, federal resources can be used more efficiently.

Dr. Diane Bunce spoke for the American Chemical Society and offered her critique of H.R. 4272:

- Funding for summer professional development institutes, and the emphasis on content-based programs are key provisions of H.R. 4272.
- Summer institutes should be a part of university degree programs, with college credit available.
- Creation of another government body to oversee curricula development is unwarranted, particularly because it would duplicate the National Science Education Standards and the AAAS Project 2061 Benchmarks.
- A mentoring program linked with the Master Teacher program would improve teacher quality and retention.
- Science education should begin at a young age, and programs such as After-School Science Day Care are a great way of involving parents in this education.

Dr. Audrey Champagne spoke extensively on teacher education, and possible improvements.

- Participation in induction and continuing education programs must be part of a teacher's work year and recognized as a professional responsibility for everyone.
- Mentoring is crucial because new teachers are given the same responsibilities as veteran teachers.
- The nature of the understanding of science that teachers gain as a result of their undergraduate education is quite different from the understanding of science required to teach science.
- The college faculty who teach undergraduate science courses should also have the opportunity to participate with K–12 teachers in continuing education activities.

• Because of their ties to the National Science Foundation, the NSF Centers for Learning and Teaching are uniquely positioned to bring the most recent research in the social and natural sciences to education.

Dr. Janice Gruendel's testimony focused on technology, and American teachers' lack of proficiency in using it.

• Technology is the most fundamental tool in all disciplines including math, science and engineering.

• Many classrooms are still not wired for the internet and only 20–33% of teachers believe they are skilled enough to use technology for instruction.

• The most common technology assignments consist of "skill and drill" and very few promote critical thinking.

• H.R. 4272 would make important strides in encouraging technology education, especially through work study initiatives.

• Allocations in and the effective use of technology are not sufficient to meet the needs of our current economic environment.

4.1(l)— NASA's Mars Program After the Young Report, Part 2

June 20, 2000

Hearing Volume No. 106–96

Background

On June 20, 2000, the Committee on Science held a hearing on NASA's Mars program in the context of the Mars Program Independent Assessment Team's (MPIAT) report released on March 14, 2000. This hearing followed on the Committee's hearing on the same subject held on April 12, 2000.

Witnesses included: the Honorable Dan Goldin, Administrator of NASA; Dr. Edward Stone, the Director of the Jet Propulsion Laboratory at the California Institute of Technology; Dr. Pedro Rustan, retired Colonel, U.S. Air Force, former Director of the Small Satellite Development Office at the National Reconnaissance Office, and the program manager of the Department of Defense's Clementine mission; and Dr. Alan Binder, Director of the Lunar Research Institute and Principal Investigator for NASA's Lunar Prospector mission.

Summary of hearing

Mr. Goldin discussed the current state of NASA's Mars Program and NASA's reaction to the findings and recommendations of the reports issued on the Mars '98 mission failures. In addition, he described the steps NASA has taken—and will take—to address the problems in the Mars Program, and the current status of the "Faster, Better, Cheaper" philosophy at NASA.

Dr. Stone addressed these same issues from the perspective of the Jet Propulsion Laboratory.

Dr. Rustan offered his perspective on the findings and recommendations of the Mars Program Independent Assessment Team, described relevant similarities and differences between the Clementine mission and NASA's recent Mars missions, and made general suggestions for successful implementation of the "Faster, Better, Cheaper" concept at NASA.

Dr. Alan Binder made general comments on NASA's Mars program and the Faster, Better, Cheaper" concept from his perspective as the manager of the Lunar Prospector mission.

4.1(m)—Encouraging Science, Math, Engineering and Technology Education in Kindergarten Through 12th Grade and H.R. 4273, National Science Education Incentive Act

July 19, 2000

Hearing Volume No. 106–82

Background

The purpose of this hearing is to examine certain provisions that would modify the tax code to encourage activities that will benefit science, math, engineering and technology (SMET) education and the "National Science Education Incentive Act" (H.R. 4273), introduced by Representative Vernon J. Ehlers (MI). Like its companion bills, H.R. 4273 focuses on two primary components of quality education: opportunities for all students and assistance for teachers.

The Committee heard from Dr. Judith Sunley, Acting Director, Education and Human Resources, National Science Foundation; Mr. Alfred R. Berkeley III, President, The NASDAQ Stock Market; Dr. Cozette Buckney, Chief Educational Officer, Chicago Public Schools; Mr. Ted Gardella, K–12 Mathematics and Science Coordinator, Battle Creek Public Schools.

Summary of hearing

Ms. Sunley discussed H.R. 4271, 4272, and 4273 and the resulting action of the National Science Foundation (NSF) and noted that:

- Math and science teachers face isolation in the classroom, separation from ongoing developments in math and science disciplines, and responsibilities that go well beyond math and science.
- Math and science teachers must understand the current and potential role of information technologies in education, what makes them effective, and how to expand that effectiveness.
- Math and science teachers must develop, identify, and disseminate excellent curricula and instructional materials for math and science.

Mr. Berkeley discussed the Stock Market's interest in K–12 education and how to improve education using H.R. 4273 and pointed out that:

- There must be continued investments in basic research and education in math and science.
- We need to pay attention to what sort of curricula are being offered to children and how effective it is in the long run.
- Long term benefits of a tax-incentive have been beneficial on the financial side and will be effective for education as well.
- Children need to know exactly what his/her grade means in comparison to other children from across the United States.

Dr. Buckney discussed the improvements in the Chicago Public School system and how those improvements worked and how H.R. 4273 would supplement the improvements and noted that:

• Chicago Public Schools have been working for many years to improve science and math education, most notably by requiring three years of lab science and three years of math.

• The Chicago Public School system has created a special program that links high schools with local colleges and universities.

• The Chicago Public School system has been aggressively recruiting teachers from the best colleges in the nation, and providing all teachers with extensive professional training.

• The financial incentives would help attract college students to the teaching profession.

Mr. Gardella discussed the math and science programs at the Battle Creek Public Schools in Michigan and the benefits of H.R. 4273 for his, and other, school districts and pointed out that:

• Battle Creek Public Schools have engaged in creative hiring by bringing in candidates with content knowledge who may not have taken the traditional route to teaching.

• The science and math teachers who experienced the high quality institutes developed in the post-Sputnik era is diminishing rapidly through retirement.

• The long term nature of the tax credits will allow teachers to keep teaching and that will help professional development programs have maximum effect.

• Working in the business, industrial, and other scientific settings allow teachers to gain powerful insights for getting real-world connections, which they can bring into the classroom.

4.1(n)—Computer Security Lapses: Should FAA Be Grounded?

September 27, 2000

Hearing Volume No. 106–101

Background

The purpose of the hearing is to review whether the Federal Aviation Administration (FAA) has taken adequate actions to correct computer security problems at the agency. FAA has a policy that requires the FAA to conduct background checks on contractor employees based upon the level of risk associated with the project or task. FAA has not complied with its own policy. In December 1999, the General Accounting Office (GAO) issued a report entitled Computer Security: FAA Needs to Improve Controls Over Use of Foreign Nationals to Remediate and Review Software for the Committee. GAO found that FAA failed to adhere to its requirements for personnel security. FAA did not perform risk assessments and did not even know at that time whether it or the contractor had performed the required background searches on all of the FAA contractor employees, including those who are the foreign nationals.

The Committee heard from The Honorable Jane Garvey, Administrator, Federal Aviation Administration; The Honorable Kenneth M. Mead, Inspector General, U.S. Department of Transportation; and Mr. Joel Willemssen, Director, Civil Agencies Information Systems, Accounting and Information Management Division, U.S. General Accounting Office.

Summary of hearing

Ms. Garvey testified that the FAA is taking action based upon the GAO's recommendations and noted that:

- FAA has moved to identify all contracts associated with mission critical systems.
- FAA recognizes that it must have effective leadership to establish the policies.
- FAA has five layers of security: personnel security, physical security, system security, site specific adaptation and redundancy.
- FAA has set up a Chief Information Officer, who is the lead officer for information security. The CIO establishes annual performance plan to achieve goals of computer security.

Mr. Mead discussed personnel security for government and contractor personnel at FAA and pointed out that:

- FAA is too reactive with lots of room to be proactive.
- There were significant vulnerabilities that were low cost to fix.
- FAA needs to work with OPM to set milestones and then prioritize.
- Many of the FAA computers are vulnerable to attack by insiders.

Mr. Willemssen discussed FAA's computer security problems, which leave the systems at risk and noted that:

- Significant weaknesses were found in each of the major areas GAO reviewed.
- FAA has numerous facilities that have not been assessed and accredited as secure.
- FAA's own system penetration testing and vulnerability assessments demonstrate significant weaknesses potentially exposing the systems to unauthorized access.
- FAA has restructured the CIO position, but more needs to be done to establish specific procedures to be followed by staff.
- FAA's own system penetration testing and vulnerability assessments demonstrate significant weaknesses potentially exposing the systems to unauthorized access.
- FAA has restructured the CIO position, but more needs to be done to establish specific procedures to be followed by staff.

4.1(o)—Intolerance at EPA: Harming People, Harming Science?

October 4, 2000

Hearing Volume No. 106–103

Background

Accordingly, this hearing will examine allegations that EPA has discriminated against scientists and employees based on their race and gender; and has retaliated against those who have made these allegations. Open discourse is required for credible science and open discourse and tolerance for dissent are key for EPA to successfully complete its mission. Intolerance inhibits, if not prevents, thorough scientific investigation. Additionally, assigning EPA employees to conduct science when those employees are not qualified in the field further harms science at EPA. The integrity of EPA science is at risk if these allegations are true. This hearing is a

continuation of the Committee's investigation into evidence that EPA ignores and harasses scientists and employees who have disagreed with EPA's policy conclusions or questioned EPA's science. The Committee has already held one hearing on this issue on March 22, 2000. Learning of the Committee's investigation into possible intolerance at EPA, several African-American and disabled EPA employees came forward with new allegations last fall.

Witnesses included: Carol Browner, Administrator of the U.S. Environmental Protection Agency; Dr. Marsha Coleman-Adebayo, Senior Advisor to the Director of the Office of Pollution Prevention and Toxics, U.S. EPA; Ron Harris, Chief Union Steward, Non-Professional, Vice President; and Leroy W. Warren, Jr., Chairman of the NAACP Federal Sector Task Force.

Summary of hearing

Dr. Marsha Coleman-Adebayo discussed the intolerant atmosphere at the U.S. Environmental Protection Agency and noted that:

- She believed her background as an African affairs specialist would be an asset to the EPA, instead she has endured a decade of racial, sexual, and retaliatory abuse.
- The EPA suffers from a racial bias in which people with significantly less experience are given a job on the basis of skin color.
- Even after she brought suit against the EPA, she still suffered from civil rights violations.
- The EPA has refused to police itself and address injustices that occur.

Mr. Ron Harris discussed how retaliation and discrimination cases were dealt with at the EPA and pointed out that:

- These cases manipulate scientific disciplines and they usually encompass many violations ranging from conspiracy to environmental racism.
- When he was investigating a case, he claims he was subject to unnecessary delays by the EPA, cancellations of meetings, and denial of basic discovery rights.
- If an employee speaks out about alleged retaliation and discrimination, he/she may be denied training or may not be given positions that they are the most qualified for.
- If an employee speaks out, his or her position may be given to someone who is grossly unqualified.

Mr. Leroy Warren discussed the lack of accountability and integrity within the EPA and noted that:

- There is an integrated work force on paper, and a segregated work force off paper.
- There is no integrity within the internal structure of the EPA to "do the right thing", nor is there any accountability when someone does not do the right thing.
- If an employee speaks out, he or she is facing a death sentence within the EPA; he or she will have a job, but no future.
- The EEO program is in place, but its rules are not enforced; and EEO management needs to be investigated by outside counsel.

Administrator Browner discussed the EPA's commitment to diversification and pointed out that:

• Minority representation in the Senior Executive Service has more than tripled and minority representation as a whole has increased by 116%.

• 77% of EPA employees are satisfied with their jobs, which is higher than the government average of 60%.

• In 1997, EPA launched a Diversity Action Plan, which set up a way for employees to comment on their managers.

• The EPA is committed to restructuring the EEO complaint process to make it timelier.

4.2—Subcommittee on Basic Research

4.2(a)—The National Earthquake Hazards Reduction Program Reauthorization

February 23, 1999

Hearing Volume Number 106–17

Background

On February 23, 1999, the Subcommittee on Basic Research held a hearing on the National Earthquake Hazards Reduction Program (NEHRP). This hearing examined the Administration's Fiscal Year 2000 budget request for this program as well as programmatic issues. The purpose of this hearing was to assess the current status of the Federal government's earthquake research and earthquake hazard mitigation efforts and to give the agencies and stakeholders an opportunity to provide input needed for a two-year reauthorization of the Program. In addition, the Subcommittee explored the Program's future goals and objectives as well as plans for achieving these goals and objectives.

Witnesses before the Subcommittee included: Mr. Michael J. Armstrong, Associate Director for Mitigation, FEMA; Dr. P. Patrick Leahy, Chief Geologist, USGS; Dr. Joseph Bordogna, Acting Deputy Director, NSF; Raymond Kammer, Director, NIST; Dr. Daniel Abrams, Director, Mid-America Earthquake Center; and Mr. Christopher Arnold, President, Earthquake Engineering Research Center.

Summary of hearing

Mr. Armstrong testified by describing the two roles FEMA plays within NEHRP: (1) Lead Agency—FEMA serves as Program coordinator; and (2) Emergency Management Agency—FEMA works to reduce losses resulting from earthquakes. He announced the creation of a strategic plan for the Program and announced its goals: (1) accelerate implementation of earthquake loss reduction practices; (2) improve techniques to reduce seismic vulnerability; (3) improve quality and use of seismic hazard and risk identification; and (4) improve the understanding of earthquakes. Mr. Armstrong concluded his testimony by highlighting several of the successes resulting from NEHRP, which range from the development of building guidelines and hazard maps to progress made through research activities.

Dr. Leahy described the three roles of the Survey in NEHRP: (1) producing earthquake loss products; (2) providing earthquake noti-

fications; and (3) supporting earthquake research. He testified earthquake loss products include hazard assessments that give the expected severity of shaking at a given location in a given time frame. These were used, in conjunction with state and professional organizations, to develop national seismic hazard maps, which in turn will be used to create the new international building codes. To carry out the Survey's second role, USGS operates the National Earthquake Information Center, the National Seismograph Network and supports 13 regional seismic networks. Dr. Leahy closed his testimony by pointing out two areas of need: a comprehensive upgrade of the seismic monitoring system and an external advisory committee for the USGS within NEHRP.

Dr. Bordogna reviewed two of the initiatives being undertaken by NSF. The first, the Network for Earthquake Engineering Simulation (NEES) will be an integrated system of new and upgraded research facilities. The second, the Incorporated Research Institutes in Seismology (IRSIS), which is a consortium that provides seismographic monitoring facilities, including the Global Seismographic Network (GSN). He closed his testimony by stating NEES, IRIS and other NSF-sponsored activities will continue to make long-term contributions to the safety and welfare of the country.

Mr. Kammer testified NIST's role in NEHRP is to conduct research that will improve building and lifeline codes, practices and standards, which supports other earthquake research. He used video to demonstrate examples of research techniques. He closed his testimony by adding NIST has been working with other government entities and professional organizations both to develop such standards and to solve earthquake-related problems, such as post-earthquake fires.

Dr. Abrams explained his organization conducts earthquake engineering research aimed at reducing the losses associated with earthquakes. He explained the need for continued research by citing current examples of the application of research findings: provisions for the seismic design of new buildings, recently published guidelines for seismic rehabilitation of buildings, and the loss estimate methodology known as HAZUS. The future of earthquake engineering research, he said, should include progress propelled by advanced technologies, maturity of NEHRP, continued earthquake reconnaissance, the new NEES program, continuation of the three earthquake centers, and research that takes into consideration other hazards.

Mr. Arnold commented on the performance-based engineering research undertaken by EERI members which is resulting in new design and construction methodology. Research supported by NSF and a study commissioned by FEMA are two examples of EERI's involvement in NEHRP. He testified EERI supports the NEES initiative proposed by NSF. Finally, he closed his testimony by commenting that social science research is also an important area in which research should be conducted to provide guidance on how to apply technical solutions.

4.2(b)—Information Technology for the 21st Century

March 16, 1999

Hearing Volume Number 106–20

Background

On Tuesday, March 16, 1999, the Subcommittee on Basic Research held a hearing on the Administration's "Information Technology for the 21st Century" initiative, better known as IT^2. The hearing focused on the three research areas highlighted in the proposal—(1) fundamental, long-term research in computer science; (2) advanced computational activities; and, (3) the economic and social implications of information technology—and how these would complement, build upon, or duplicate current federal activities conducted through the High-Performance Computing and Communications, Next Generation Internet, and other federal programs.

Witnesses appearing before the Subcommittee included: Dr. Neal Lane, Assistant to the President for Science and Technology, Director, Office of Science and Technology Policy; Dr. Ken Kennedy, Co-Chair, President's Information Technology Advisory Committee and Director, Center for Research on Parallel Computation, Rice University; Dr. Erich Bloch, President, Washington Advisory Group and Distinguished Fellow, Council on Competitiveness; Dr. Stephen Wolff, Executive Director, Advanced Internet Initiatives Division, Cisco Systems; Dr. Fred Hausheer, Chairman and CEO, BioNumerick Pharmaceuticals; and Dr. Hal R. Varian, Dean, School of Information Management, University of California, Berkeley.

Summary of hearing

Dr. Lane testified the Administration focused on information technology (IT) research in the fiscal year 2000 R&D budget for three central reasons: (1) IT has become a key driver of the economy; (2) IT is essential for achieving some of our most overarching public goals; and (3) Federal investment in fundamental IT research is essential to provide the reservoir of ideas that will lead to IT innovations in the generations to come. The President's IT^2 initiative, which would provide $366 million in new funding, is a direct response to the PITAC's recommendation for increased Federal support of fundamental, long-term IT research in three areas: (1) long-term fundamental research aimed at fundamental advances in computing and communications; (2) advanced computing infrastructure as a tool to facilitate important scientific and engineering discoveries of national interest; and (3) expanded research into social, economic, and workforce impacts of information technology, including transformation of social institutions, impact of legislation and regulation, electronic commerce, barriers to information technology diffusion, and effective use of technology in education. Six agencies will participate in the program: the Department of Defense, Department of Energy, National Aeronautics and Space Administration, National Institutes of Health (NIH), National Oceanic and Atmospheric Administration, and National Science Foundation.

Dr. Kennedy summarized PITAC's principal finding, i.e., there has been a pronounced shift in Federal IT programs away from long-term high-risk projects toward short-term, applied research linked to mission agencies. PITAC believes unless this shift away from fundamental high-risk research is reversed, it will threaten the Nation's economic leadership, along with the continued beneficial effects on the health and welfare of its citizens. PITAC recommended four areas requiring greater research: (1) software; (2) scalable information infrastructure; (3) high-end computing; and (4) social, economic, and workforce implications. In addition, PITAC recommended developing strategic initiatives for long-term R&D, funding projects for longer periods, establishing an effective structure for managing and co-ordinating R&D, and increasing spending by $1.4 billion by Fiscal Year 2004.

Dr. Erich Bloc noted the history of Federal investment in information technology research is studded with examples of research that would never have been done—and discoveries that could never have been made—if it had been left to the private sector alone. These innovations have spawned new industries and created tens of thousands of high paying jobs. Dr. Bloc agreed with PITAC there is an increased need for research to address the challenges of an evolving information infrastructure supported the government's continuing role to support basic research in IT. The budget Congress will consider for research on information technology for the coming fiscal year should include sustained support for research aimed at setting and achieving difficult goals over the next five to ten years.

Dr. Wolff testified Cisco supports the principal findings of PITAC and the Administration's responsiveness to its recommendations via the IT^2 program. The proposed long-term research in "deeply networked systems" will support and complement nascent industry initiatives in Electronic Persistent Presence—ubiquitous, very large-scale, and permanent Internet connectivity. The IT^2 thrust in modeling and simulation will also support this massive growth. Within both the software and the socio-economic areas, a research thrust related to cryptography is required. The sub-programs on economic and social implications on workforce development complement and support industry activities. There are management issues concerning the relation of IT^2 to existing programs.

Dr. Hausheer discussed the importance of IT to biomedical research. The success of the NIH component of the IT^2 initiative is critical to using the vast amount of genomic and biological information generated by the human genome project to benefit patients. NIH's IT goals should include: (1) on-site supercomputing capability advanced in the near term to multi-teraflops, and ultimately petaflop capability; (2) dedicated biomedical IT training and research program for physicians and scientists; (3) dedicated NIH software development on-site with laboratory validation of simulations; (4) avoid "off-the-shelf, just as fast, but cheaper" computing research projects; and (5) greater IT-biomedical research representation on PITAC.

Dr. Varian spoke to the socio-economic aspects of the IT^2 proposal. IT also will have a significant impact on law, education, commerce, organizations, and communities. Policy choices made now,

such as definition of technological and legal standards, will be with us for a long time, and attention must be paid not only to their technological merit, but also their social and economic impact. Understanding the social and economic consequences of our technological choices is vitally important in achieving the full potential of advances in IT.

4.2(c)—The United States Fire Administration (USFA) Authorization for Fiscal Years 2000 and 2001

March 23, 1999

Hearing Volume Number 106–19

Background

On Tuesday, March 23, 1999, the Subcommittee on Basic Research held a hearing on the United States Fire Administration (USFA) and its National Fire Academy (NFA). This hearing examined the Administration's Fiscal Year 2000 budget request for this program as well as programmatic issues. The purpose of this hearing was to assess the current status of the NFA and the programs offered through the USFA and consider issues related to a two-year authorization of the U.S. Fire Administration.

Witnesses before the Subcommittee included: The Honorable James Lee Witt, Director, Federal Emergency Management Agency; Dr. Karen Brown, Deputy Director, on behalf of the Honorable Raymond Kammer, Director, National Institute of Standards and Technology; Mr. Stephen Austin, Chair, Blue Ribbon Panel and External Affairs Representative, International Association of Arson Investigators, Inc.; Chief Luther Fincher, First Vice President, International Association of Fire Chiefs; Dr. John R. Hall, Assistant Vice President, Fire Analysis and Research, National Fire Protection Association; and Salvador Morales, Member, Blue Ribbon Panel and Driver Engineer, Dallas Fire Department.

Summary of hearing

Director Witt began by discussing the recommendations for reform of the U.S. Fire Administration made by the Blue Ribbon Panel. He then reviewed FEMA's blueprint for change within the Fire Administration, including increased funding requests for the data collection system, public education materials, and firefighter training activities. He added FEMA also is going to be working with national fire organizations on prevention and protection efforts. Director Witt added that FEMA is going to be re-commissioning America Burning so the current state of fire dangers in the Nation can be determined. He closed his testimony by acknowledging challenges facing the agency, such as reaching those most vulnerable to fire losses.

Dr. Brown testified by reviewing NIST's responsibilities under the Fire Prevention and Control Act: serving as the Nation's leading fire research laboratory and having responsibility for national fire safety policy and programs. She explained NIST's strategy for meeting these obligations has been both to identify the most common situations that result in fire death and develop intervention strategies and technologies and to conduct fundamental fire re-

search and develop fire safety materials, products, systems and facilities. These activities, along with cooperative efforts with other Federal agencies, private sector organizations and the fire services have led to decreased fire death rates; new practices, standards, code provisions; and new technologies, such as residential smoke detectors. She concluded her testimony by emphasizing the recommendation of the Blue Ribbon Panel report that called for increasing fire research.

Mr. Austin testified by highlighting the recommendations of the Blue Ribbon Panel report. He explained the Panel does not want the USFA to assume added responsibilities, but to improve upon current responsibilities. He explained funding increases are necessary in order to maintain the responsibilities the USFA has successfully fulfilled. Mr. Austin pointed out the development of residential smoke detectors and sprinkler systems as proof for continued investment in research. He also stressed the importance of improving the fire data collection system, as this information is necessary to developing strategies for fire protection and public safety education. Finally, he noted a lack of resources is inhibiting the National Fire Academy from reaching its capability, which is both needed and requested by the fire services community. He concluded his testimony by stating support for the Fire Administration.

Chief Fincher relayed the support of the Fire Service Leadership Summit participants for the recommendations of the Blue Ribbon Panel and the Administration's FY 2000 budget request. He highlighted four areas of particular importance. He stated two of these areas, organizational structure and management and leadership issues, must be addressed before other problems can be addressed. The final two priorities for which he testified increased funding should be allocated are the National Fire Incident Reporting System and research and development. He concluded by adding appreciation for the attention being paid to the Fire Administration by the Congress and by FEMA.

Dr. Hall testified about the importance of the National Fire Incident Reporting System as the core of the Nation's basis for fire data. Continuous underfunding has inhibited NFIRS from fully being successful. Next, he spoke of the progress gained by fire research, especially that done by NIST, in developing fire protection technology. He suggested the USFA partner with other fire researchers through long-term partnerships in order to increase the volume of fire research conducted. Finally, he recommended the USFA leverage resources by partnering with national organizations in fire safety and prevention efforts. He concluded his testimony by offering support for the reauthorization of the USFA.

Mr. Morales highlighted some of the recommendations of the Blue Ribbon Panel. Specifically, he advocated increasing funding for educational materials to be used in conjunction with Federal, state and local organizations in order to meet the USFA goal of reducing the risk of loss of life and property from fire-related hazards by five percent by the year 2000. Next, he reiterated the Panel's support for upgrading the NFIRS system and for increasing investment in fire research, arson research and prevention, and anti-terrorism training. He concluded his testimony by supporting the Pan-

el's recommendation for increased funding to the National Fire Academy.

4.2(d)—H.R. 749, The Home Page Tax Repeal Act

March 24, 1999

Hearing Volume Number 106–38

Background

On Wednesday, March 24, 1999, the Subcommittee on Basic Research held a hearing to examine the "Home Page Tax Repeal Act" (H.R. 749), introduced by Rep. Lee Terry (R–NE). The bill would repeal section 8003 of the 1998 Emergency Supplemental Appropriations and Rescissions Act (P.L. 105–174), which granted authority retroactively to the National Science Foundation (NSF) to collect a fee for use to support Internet development. Rep. Terry's bill also would allow NSF to use funds appropriated in Fiscal Year 1999 to meet any obligation arising from the repeal of section 8003.

Witnesses appearing before the Subcommittee included: The Honorable Lee Terry, Member of Congress (R–NE); Mr. Lawrence Rudolph, General Counsel, National Science Foundation, Arlington, Virginia; Mr. David McClure, Executive Director, Association of Online Professionals, Alexandria, Virginia; and Mr. Dan Troy, Partner, Wiley, Rein & Fielding and Associate Scholar, American Enterprise Institute, Washington, D.C.

Summary of hearing

Congressman Terry stated his bill, by eliminating this fee/tax, would keep the Internet free of taxes as proposed by the Internet Tax Freedom Act that was passed in the 105th Congress. He further stated Congress had not authorized this tax and therefore the NSF had exceeded its authority and allowing a retroactive tax to continue would harm the future growth of the Internet.

Mr. Rudolph testified the NSF did have the authority to create the Internet Intellectual Infrastructure Fund (IIF) under well-known government rules governing cooperative agreements. Mr. Rudolph stated under OMB Circular A–110, the charge was legal and would be treated as "program income." He stated the NSF has used this fee-structure on several other NSF projects. He noted NSF's disagreement with the district court's decision and the appeal process was still under way. He was concerned the bill did not outline how the money collected by the fee would be sent back to the payers, if the bill was enacted. He also stated the NSF took great offense at the charge that it was a "renegade" agency.

Mr. McClure stated that allowing retroactive taxation of the Internet would establish a dangerous precedent. Mr. McClure praised the Internet Tax Freedom Act and noted that there is increasing pressure to tax the World Wide Web. He concluded his testimony by stating that keeping the Internet tax-free is in the long-term a benefit to the country.

Mr. Troy stressed three points in his testimony. First, the Constitution vests the Congress with the exclusive power to tax. Allowing agencies to establish their own, unauthorized taxes is dangerous and lacks democratic legitimacy. Second, allowing this retro-

active authorization of an unconstitutional tax would encourage other agencies to do the same. Third, eliminating this tax will emphasize the principles written into the Internet Tax Freedom Act.

4.2(e)—National Science Foundation Fiscal Year 2000 Budget Request

April 28, 1999

Hearing Volume Number 106–12

Background

On Wednesday, April 28, 1999, the Subcommittee on Basic Research held a hearing to review the National Science Foundation's (NSF) budget request for FY 2000. The Subcommittee heard testimony from the National Science Foundation and the National Science Board.

Witnesses appearing before the Subcommittee included: Dr. Rita Colwell, Director, National Science Foundation, and Dr. Eamon Kelly, Member, National Science Board.

Summary of the hearing

Dr. Kelly testified more research is done by the private sector than by government. His concern is that only the government supports true fundamental science, while corporate funded research is usually short-term projects. In addition, he stated as a percentage of the money spent by the government for R&D, a lower amount now goes to basic research than has in the past. His argument is basic research will pay-off in the long term. As an example, he noted four of the top ten companies listed on the Fortune 500 list were not even on the list at all ten years ago.

Dr. Colwell testified by discussing the IT^2 Initiative. She stated information technology is responsible for close to one-third of the economic growth in the 1990s and it is a national imperative to continue to support funding basic research in the field of information technology. She then discussed the issue of biocomplexity and its importance to multi-disciplinary projects at the NSF. Like Dr. Kelly, Dr. Colwell was concerned that a lower percentage of government R&D funding now goes into engineering, while a larger percentage is going into the life sciences and other applied sciences.

4.2(f)—The U.S. Antarctic Research Program

June 9, 1999

Hearing Volume Number 106–57

Background

On Wednesday, June 9, 1999, the Subcommittee on Basic Research held a hearing addressing issues related to the U.S. Antarctic Research Program. The hearing examined a number of issues, including modernization of the South Pole Station, the transfer of logistical support from the Navy to the New York Air National Guard, long-term plans for McMurdo Station, recompetition of the Antarctic support contract, the impact of growing tour-

ism, weather forecasting and air traffic control, and satellite communications.

Witnesses appearing before the Subcommittee included: Dr. Karl Erb, Director, Office of Polar Programs, National Science Foundation; Brigadier General Archie J. Berberian II, Chief of Staff, New York Air National Guard; and Dr. Donal Manahan, Chairman, Polar Studies Board, National Research Council, National Academy of Sciences.

Summary of hearing

Dr. Erb emphasized the vital research being conducted in Antarctica and stressed the importance of maintaining an active presence in the region. His testimony covered a number of important issues, including: South Pole Station modernization and safety/environment upgrade; the impact of these programs on U.S. Antarctic Program science projects; the transition of air logistics support from the Navy and the New York Air National Guard; support-contract recompetition; research vessel contract recompetition; facilities improvements; weather forecasting; air traffic control and landing systems; energy conservation, satellite communications; and the effects of tourism.

General Berberian testified on the status of the transition of the ski-equipped LC–130 airlift mission in support of the U.S. Antarctic Program from the Navy to the Air National Guard. His testimony covered background on the transition and operational issues the Guard has encountered during the three-year inter-service hand-off process. General Berberian stated the transition was successful and the cost savings approached, if not surpassed, projections. He supported NSF's budget request, which included funds for upgrading three LC–130 aircraft, and advocated acquisition of classified imagery of Antarctic field sites from the National Reconnaissance Office. Gen. Berberian also addressed weather forecasting and air traffic control.

Dr. Manahan's testimony dealt with the impact of the South Pole modernization on the science being conducted in and around Antarctica. Dr. Manahan reported, for the most part, the science has been unaffected by the modernization. The one area where there has been a noticeable impact has been in deep field operations, especially those in the geological sciences. Dr. Manahan also testified the scientific community is in agreement that the modernized South Pole Station will greatly improve the opportunities for scientific research.

4.2(g)—Tornadoes: Understanding, Modeling, and Forecasting Supercell Storms

June 16, 1999

Hearing Volume Number 106–11

Background

On Wednesday, June 16, 1999, the Subcommittees on Energy and Environment and Basic Research held a joint hearing examining federally funded tornado research and how research is used by the National Weather Service (NWS) to improve warning times.

Witnesses appearing before the Subcommittees included: Mr. Dennis McCarthy, Meteorologist in Charge, Norman Weather Forecast Office; Dr. Morris Weisman, Mesoscale and Microscale Meteorology Division, National Center for Atmospheric Research; Dr. Roger Wakimoto, Professor and Chair, Department of Atmospheric Science, University of California Los Angeles; and Dr. Howard Bluestein, Professor of Meteorology, University of Oklahoma.

Summary of hearing

Mr. McCarthy testified by noting the May 3, 1999 tornado outbreak that killed 42 people and injured 795 in Oklahoma. He stated the outbreak, while tragic, demonstrated how much progress has been made in issuing accurate and timely weather warnings. He testified that on that day, outlooks, watches and warnings were issued well in advance and they were communicated rapidly. He said the media, emergency managers, local officials, volunteer spotter groups and state agencies worked in partnership to keep people informed. He pointed to technological developments such as NEXRAD Doppler radar and the Advanced Weather Interactive Processing System (AWIPS) have assisted the National Weather Service in improving its warning capabilities. He concluded by emphasizing the importance of continued tornadic storm research in improving the accuracy and timeliness of severe weather warnings.

Dr. Weisman testified by emphasizing how, over the past two decades, much progress has been made in understanding and forecasting tornado outbreaks that devastated Oklahoma and Kansas on May 3, 1999. He stated this progress has come about through a strong connection between the research and forecast communities. Dr. Weisman used radar images of the May 3rd tornadoes, along with training materials developed for the National Weather Service, to illustrate the local conditions that form such storms, detailed the physical aspects of the storms, and reviewed new forecasting theories and applications. He also presented results from experimental forecast models which were run on May 3rd which offer hope that such events could some day be forecast hours in advance, rather than the 10–30 minute warning times currently available.

Dr. Wakimoto noted the science of forecasting the atmospheric conditions that will lead to the development of a supercell storm is rather effective; whereas, the science surrounding the development of a tornado within a supercell is not nearly so well-understood. He testified some important questions remain unanswered: what triggers the genesis of a tornado in a supercell? What is the origin of rotation within supercell tornadoes? He also stated more research is necessary in understanding tornadoes that form in non-supercell storms, such as those that form in so-called "bow" echo storms.

Dr. Blustein testified on federally funded research aimed at understanding the formation and behavior of tornadoes. He highlighted the success of new radar technologies including the NEXRAD and mobile Doppler systems, noting these technologies give researchers a much higher-resolution look at the structure of tornadoes. He stated new radar technology, and faster and larger computers, researchers can make great progress in the next five to

ten years in determining how and why tornadoes form, and in developing the best ways to protect the citizenry.

4.2(h)—Nanotechnology: The State of Nano-Science and Its Prospects for the Next Decade

June 22, 1999

Hearing Volume Number 106–40

Background

On Tuesday, June 22, 1999, the Subcommittee on Basic Research held a hearing on the state of nanotechnology. The purpose of the hearing was to review federal funding of nanotechnology research, to discuss the role of the federal government in supporting nanoscience research, and to discuss the economic implications of scientific advances made in the field of nanotechnology.

Witnesses appearing before the Subcommittee included: Dr. Eugene Wong, the Assistant Director of NSF's Engineering Directorate, National Science Foundation; Professor Richard Smalley, Ph.D., Rice University; Dr. Ralph C. Merkle, XEROX; and Mr. Paul McWhorter, Deputy Director, Sandia National Laboratories' Microsystems Science, Technology and Components Center.

Summary of hearing

Dr. Wong testified by defining the word "nanoscale". A nanometer is one-billionth of a meter. The diameter of an atom is about ¼ of 1 nanometer. Over the last twenty years a series of instruments have been developed that allow researchers to control objects at the nanoscale level. The ability to control and manipulate objects at the molecular level will allow researchers and manufacturers to produce revolutionary products. One example, the "nanochip" allows a single researcher to complete gene-characterizations in a few hours rather than over a few years as has been the case.

Dr. Smalley testified our society is already seeing the initial uses of nanotechnology. Dr. Smalley used his own experience with chemotherapy as an example of how today's biotech industry is, in fact, a crude version of the nanotechnology that will exist in the next few decades. He also testified a national initiative, "Nanotechnology for the Twenty-First Century: Leading to a New Industrial Revolution", will be recommended as part of the Administration's Fiscal Year 2001 budget. The initiative will support long-term nanotechnology research and development. The proposed level of additional annual funding approximately doubles (by $260 M) the current level of effort, incrementally increased over three years. This initiative will focus on fundamental research on novel phenomena, processes and tools; synthesis and processing by design; nanostructured devices, materials and systems that are high risk, broadly enabling and are designed to have major impact; as well as education and training of future nanotechnology workers; and rapid technology transfer.

Mr. McWhorter discussed the progress made over the past fifty years in the field of micro-electronics and how that progress will lead to a "second silicon revolution" involving micro-machines made

using nanotechnology. One benefit of establishing a national initiative on nanotechnology is it will generate a sense of unity among the many individual researchers working in this field. Mr. McWhorter argued nanotechnology is unlike attempting to send someone to the moon because that initiative had one well-known and well-defined goal—nanotechnology is an example of "small science" in which many individual researchers work separately on non-related projects.

Dr. Merkle testified by giving a few examples of the uses of nanotechnology. We will be able to manufacture metals fifty times lighter than steel but with the same strength, amazingly small yet powerful molecular computers, and surgical devices so small that they could be injected into the blood-stream and guided by non-invasive computers. Dr. Merkle testified nanotechnology will reshape our entire manufacturing process and will impact every aspect of our lives. One of the more controversial issues in nanotechnology is the issue of self-replication. In biology, cells are continuously self-replicating. Dr. Merkle argued to unlock the true potential of nanotechnology researchers will need to discover a way to produce self-replicating man-made molecules. He also stated it will take 20 to 30 years to produce the nanotechnological advances discussed at this hearing.

4.2(i)—H.R. 2086, the Networking and Information Technology Research and Development Act

July 14, 1999

Hearing Volume Number 106–39

Background

On Wednesday, July 14, 1999, the Subcommittee on Basic Research held a hearing on H.R. 2086, the Networking and Information Technology Research and Development Act (NITRD Act). This hearing focused on the authorizations for appropriations for the six agencies participating in the program, including the various grants programs for long-term IT research, the Next Generation Internet program, and the terascale computing competition.

Witnesses appearing before the Subcommittee included: Dr. Neal Lane, Assistant to the President for Science and Technology, Director, Office of Science and Technology Policy; Dr. Roberta Katz, President and CEO, Technology Network; Dr. Edward D. Lazowska, Professor and Chair, Department of Computer Science & Engineering, University of Washington and Chair, Computing Research Association; and Mr. Alan Blatecky, Vice President for Information Technology, MCNC.

Summary of hearing

Dr. Lane testified the Administration strongly supports the aims of H.R. 2086 but believes there are areas where the bill could be improved. These include: including the Department of Defense and the National Institutes of Health (NIH) in the proposed legislation; providing funding for DOE's Scientific Simulation Initiative, including terascale computing infrastructure; providing increased funding for DOE's base advanced mathematics and computation programs;

funding the National Institute for Standards and Technology at the requested level for fiscal year 2000; and incorporating all of the National Oceanic and Atmospheric Administration's IT programs in H.R. 2086. In addition, the Administration also is concerned about a provision in H.R. 2086 calling for the NSF to conduct a study to assess foreign encryption technologies and domestic technologies subject to export restriction. The Administration supports the bill's provision making the R&D tax credit permanent but takes the position that it must be paid for per the PAYGO requirements of the Budget Enforcement Act.

Dr. Katz began by stating TechNet has adopted strengthening the Nation's federal investment in basic IT R&D and enacting a permanent R&D tax credit as top priorities; H.R. 2086 is an important first step in achieving consistent increases in federal support for critical IT research programs. She noted TechNet appreciates the bill's reliance on the recommendations of the President's Information Technology Advisory Committee (PITAC). In particular, TechNet supports H.R. 2086's emphasis on fundamental IT research. She observed that although the private sector provides the lion's share of IT research funding, most of this is for short-term, applied research. The bill's focus on NSF also is appropriate and in keeping with PITAC's recommendations. The bill's provisions on large-scale, long-term IT grants, completion of the Next Generation Internet program, and establishing an IT internship program were also supported by TechNet. And the five-year authorizations in the bill demonstrate a commitment to a continued strong federal investment in basic IT research. Her organization also strongly supports the permanent extension of the R&D tax credit.

Dr. Lazowska voiced strong support for the bill, saying it exemplifies a sound approach to making research policy by responding to clear national needs with recognizable objectives and setting forth a well defined program for meeting them. Concerning the legislation, Dr. Lazowska made three main points: (1) H.R. 2086 expands fundamental research in targeted critical areas and sustains successful interagency programs with multi-year funding; (2) H.R. 2086 strengthens the federal role in long-term IT research, a role industry cannot be expected to assume; and (3) H.R. 2086 appropriately increases support for the National Science Foundation, the agency with the broadest role in computing research and infrastructure. Concerning the current environment, he said: (1) NSF is undertaking a thorough planning process to maximize the benefits of IT research for all of science and engineering, and for all of society; (2) expanding the federal investment in information technology research is widely supported by the scientific community; and (3) the impact of IT on society and the economy clearly demonstrates the need for and timeliness of the NITRD Act. Calling IT a "rising tide that lifts all boats," Dr. Lazowska urged quick passage of the bill.

Mr. Blatecky noted the importance of IT to the Nation's economy and talked about the impact the North Carolina Research and Education Network, North Carolina Supercomputing Center, and North Carolina Information Highway have had on the economy of that State. He also noted the importance of a national grid of communication and computing resources and said the technology develop-

ment cycle does not address the equally important issues of scalability, long term basic research in networking and computing, software development, human interfaces, network security, information or training. H.R. 2086 directly address these needs through three key provisions: (1) long-term basic research grants for high end computing and networking; (2) provision of twenty to thirty large focused grants by NSF; and (3) establishment of eight to ten IT research centers. In addition, he supported the establishment of a scientific internship program to encourage and develop an effective mechanism to link the private sector with the universities and community colleges that will broaden the educational experience of students and create a more effective way to transfer technology.

4.2(j)—Attracting a New Generation to Math and Science: The Role of Public-Private Partnerships in Education and H.R. 1265, Mathematics and Science Proficiency Partnership Act of 1999

July 29, 1999

Hearing Volume Number 106–62

Background

On Thursday, July 29, 1999, the Subcommittee on Basic Research held a hearing to examine the role of public-private partnerships in encouraging students to pursue math and science education and to examine the "Mathematics and Science Proficiency Partnership Act of 1999" (H.R. 1265), introduced by Representative Eddie Bernice Johnson (D–TX), the Ranking Minority Member of the Subcommittee. The bill would establish a demonstration project through the National Science Foundation (NSF) to encourage student interest in the fields of mathematics, science, and information technology by creating a grant program through NSF. The grants would be awarded to eligible rural and urban educational agencies for developing or expanding mathematics, science or information technology programs.

Witnesses before the Subcommittee included: Dr. Jane Kahle, Director of NSF's Division of Elementary, Secondary and Informal Education in the Directorate for Education and Human Resources; Mr. Gerald L. Borders, Director of Public Affairs for Texas Instruments; Mr. Raymond V. (Buzz) Bartlett, Director of Corporate Affairs for Lockheed Martin Corporation; Dr. John A. Thorpe, the Executive Director of the National Council of Teachers of Mathematics; and Dr. Manuel Berriozabal, Director of the San Antonio Prefreshman Engineering Program and Professor of Mathematics at the University of Texas at San Antonio.

Summary of hearing

In her testimony, Dr. Kahle described six NSF initiatives aimed at improving science and math achievement: (1) the K–12 Systemic Initiative Programs; (2) instructional materials and curriculum development, in which texts and other materials are developed with NSF support; (3) professional development, including teacher and administrator preparation; (4) the Digital Libraries Initiative project, which will create a virtual facility to link students, teachers and faculty and provide access to educational materials; (5) re-

search on learning and education, with a particular emphasis on the Interagency Education Research Initiative, a joint project with the Department of Education (DoEd) and the National Institutes of Health (NIH); and (6) the Graduate Teaching Fellows Program, which pairs graduate students with K–12 teachers and brings the graduate students into the classroom.

Mr. Borders began his testimony by describing and showing an example of a Texas Instruments semiconductor chip. He went on to say that because Texas Instruments relies on a highly technologically skilled workforce to make such products, the company has made support of educational programs a corporate priority. Texas Instruments has already formed a partnership with NSF as part of the Urban Systemic Programs and is involved in training teachers in order to help them integrate learning technologies into their school districts. Furthermore, plans are currently underway to create an alliance between NSF and more than 3000 member companies of the American Electronics Association. Mr. Borders closed by offering support for H.R. 1265.

Mr. Bartlett described Lockheed Martin Corporation's involvement in education, stating of the $10 million spent by the corporation on philanthropy every year, two thirds of that sum is spent on education, with $800,000 of that going to programs at the K–12 level. Most, if not all, of Lockheed's 50 operating companies are involved in programs in local schools. Mr. Bartlett then described one such programs: an intern program at Lockheed Martin Missile Systems in Gaithersburg, Maryland. Lockheed Martin has also been involved in the movement to introduce standards, assessments and accountability in schools, and Mr. Bartlett stressed the need for teacher professional development and the introduction of more rigorous curricula, and indicated support for H.R. 1265 to the extent it supports those goals.

Dr. Thorpe briefly described the National Council of Teachers of Mathematics, which represents more than 100,000 mathematics teachers and has been involved in curriculum and professional development. He also stressed the importance of addressing the needs of students in urban and rural school districts. The most important aspect of improving math and science education, he said, is the role of teachers, and he pointed out currently, approximately 40 percent of the Nation's teachers are teaching outside of their area of professional competency. Qualified teachers who have access to high quality professional development programs, he said, are critical to improving math and science education, and he indicated support for H.R. 1265, saying the bill recognizes the important role of teachers in improving education.

Dr. Berriozabal described the San Antonio Prefreshman Engineering Program, a mathematics-based academic enrichment program for middle and high school students interested in science, mathematics, and engineering careers. The program operates in partnership with private industry and provides supplemental mathematics instruction to students, with special efforts dedicated to the recruitment of women and minorities. Dr. Berriozabal closed by suggesting the public and private sectors ought to identify precollege programs that have a proven record of achievement and provide for their support. He also indicated support for private-sec-

tor underwriting of college scholarships for deserving students interested in pursuing science, engineering, or information technology careers.

4.2(k)—Plant Genome Science: From the Lab to the Field to the Market, Part I

August 3, 1999

Hearing Volume Number 106–60

Background

On August 3, 1999 the Subcommittee on Basic Research held the first of a series of hearings to review federal funding for plant genome research; the role of the Federal Government in supporting plant genome research; and the potential impact of this research on agriculture and the marketing of agricultural products.

Witnesses before the Subcommittee included: Dr. Mary Clutter, the Assistant Director of NSF's Directorate for Biological Sciences; Dr. Eileen Kennedy, the Deputy Assistant Secretary for Research, Education, and Economics at the U.S. Department of Agriculture; Dr. Kenneth Keegstra, Director and Professor, Michigan State University Plant Research Laboratory; Dr. John Ryals, the Chief Executive Officer of Paradigm Genetics; and Dr. Susanne Huttner, Director of the Biotechnology Research and Education Program at the University of California.

Summary of hearing

Dr. Clutter stressed NSF's role in funding plant biology research in the U.S., in part by providing over 50 percent of all competitively awarded support for basic plant biology research that is conducted in colleges and universities. Dr. Clutter stated NSF's Plant Genome Program alone provided $50 million in FY 1999 for research projects involving 45 separate institutions in 23 states. One of the specific projects funded by the Plant Genome Project is the Arabidopsis Genome Research Project. The first goal of the Arabidopsis project is to determine the sequence of the plant's entire DNA complement—a project analogous to the Human Genome Project in concept. In the second stage of the project, functional analysis will be performed. In discussing the benefits of the Arabidopsis project, Dr. Clutter stressed the importance of placing all the sequencing data into public databases.

Dr. Kennedy discussed USDA's involvement in plant genome research and related areas in her testimony. Besides USDA's participation in the Arabidopsis and rice genome projects, USDA funds basic research through Agricultural Research Service (ARS) laboratories as well as through other mechanisms. Dr. Kennedy also described the Biotechnology Risk Assessment Research Grant Program, which was funded at $1.5 million in FY1999 and is aimed at sponsoring research into the impacts of biotechnology on agriculture and the environment. A goal of the program is to assist Federal regulatory agencies in making science-based decisions regarding the safety of genetically modified plants.

Dr. Keegstra described plant genome research currently being pursued at Michigan State University, a recipient of NSF Plant Ge-

nome funding. Dr. Keegstra described the researchers' use of "DNA microarray analysis," a recently developed technology aimed at determining the functions of all of the genes in an organism simultaneously. Dr. Keegstra closed his testimony by emphasizing the potential benefits of plant genome research—improved crop yields, enhanced nutritional characteristics of plant-based foods, for example—had a grounding in basic research such as that funded by NSF.

Dr. Ryals described the private sector's interest and involvement in plant genome research and agricultural biotechnology. He described the practice of genetically engineering crops as "a revolution not unlike the advent of power and light, aviation or computer technology." While scientists are able to move genes into new organisms quite readily, he stated, the major limiting step in the technology today involves the discovery of new genes. The application of genome-based techniques, he explained, would facilitate this discovery, and thus forms the basis for much of the research at agricultural biotechnology companies such as his.

Dr. Huttner testified to the crucial role of biotechnology in agriculture and food production and to the importance of the agricultural biotechnology industry. Public investments in research activities such as the Plant Genome program, she said, are an important step in increasing the level of activity in the agricultural biotechnology sector. She described a special role for small businesses, saying small firms are often fueled by investors "that take risks big agribusiness won't." Dr. Huttner warned, however, public controversy over genetically engineered crops threatens to distort U.S. regulatory policy, potentially stifling future developments. She emphasized the consensus of scientists regarding the risks associated with genetically modified foods was the new technology posed risks no different from those associated with classical agricultural techniques. She stressed current regulatory policies aimed at protecting consumers are adequate to protect the safety of humans and the environment.

4.2(l)—Overcoming Barriers to the Utilization of Technology in the Classroom

September 22, 1999

Hearing Volume No. 106–44

Background

On September 22, 1999, the Subcommittees on Technology and Basic Research held a joint hearing, which focused on technology in the K–12 classroom. In particular, the hearing examined the appropriate role of local, state, and Federal programs in helping schools get connected; the barriers that prevent schools from implementing successful technology programs; and how the private sector can be harnessed to assist schools in bringing technology into the classroom.

Witnesses included: Dr. George O. Strawn, Executive Officer, Computer and Information Science and Engineering Directorate, National Science Foundation, Arlington, VA; Mr. Alan Spoon, President, The Washington Post, Washington, DC; Dr. Elizabeth

Glowa, Director for Instructional Technology Support Team, Office of Global Access Technology, Montgomery County Public Schools, Rockville, MD; and Mr. James Fallon Jr., Superintendent of Schools, East Hartford School District, East Hartford, Connecticut.

Summary of hearing

Dr. Strawn provided an overview of the National Science Foundation's involvement with the creation of the Internet and its use in the classroom. He testified since 1996, NSF has supported research and development in novel technologies that could lower the cost of and/or lower other barriers to bringing the Internet to public schools and libraries. He testified there is a need to better understand the costs, capabilities, human resource requirements, and potential educational benefits of universal high speed Internet access for all schools. Finally, he said NSF stands ready to work with Congress and other stakeholders in education technology to develop an effective mechanism to inform policymakers in the rapidly evolving world of networking.

Mr. Spoon testified on behalf of the CEO Forum on Education and Technology. The CEO Forum is a coalition of corporate and academic leaders who joined together in 1996 to form a four-year partnership to access and monitor progress toward integrating technology in American schools. He stated the CEO Forum has committed to releasing four reports examining different areas of education technology and his testimony would focus on the Forum's third report dealing with teacher training. He stated it is important for schools to invest in professional development so teachers can successfully integrate technology in the classroom. Otherwise, schools are at a risk of wasting scarce resources on technology that will not be utilized to its fullest potential. He went on to list a set of recommendations put forth by the CEO Forum to help guide schools in preparing their teachers.

Dr. Glowa testified if technology is to realize its powerful potential for improving education, it must be used for more than just automating the traditional methods and practices of teaching. She further stated positive changes in the learning environment brought about by technology are more evolutionary than revolutionary. She stated these changes occur over a period of years, as teachers become more experienced with technology and instructional implementation strategies and are supported by effective staff development efforts. She highlighted in her testimony a list of barriers to effectively utilizing technology in the classroom.

Mr. Fallon testified regarding steps the East Hartford School District had undertaken to integrate technology in the classroom. He stated funding for technology continues to be a major obstacle—especially when schools must weight spending money on hardware and infrastructure against spending money on staff development and technology support. He stated that new technologies that facilitate the sharing of teaching units and expertise among teachers and schools districts over the World Wide Web promise a much more effective use of resources than has been possible by isolated, individual teachers acting alone.

4.2(m)—The Impact of Basic Research on Technological Innovation & National Prosperity

September 28, 1999

Hearing Volume Number 106–58

Background

On September 28, 1999 the Subcommittee on Basic Research held a hearing to review federally funded basic research programs, to discuss the technological and economic advances generated by federally funded basic research, and to discuss how policymakers can ensure the government's basic research portfolio is designed to maximize the economic results of investment in civilian research and development.

Witnesses before the Subcommittee included: Dr. Rita Colwell, Director, National Science Foundation; Dr. Fawwaz Ulaby, Vice President for Research, University of Michigan; Dr. Scott Stern, Professor, MIT Sloan School of Management; and Dr. Laurence Hirsch, M.D., Vice President, Public Affairs, Merck Research Laboratories.

Summary of hearing

Dr. Colwell testified by stating the United States has witnessed incredible technological and economic payoffs from Federal investments in basic research. As an example, she noted this week two of the Nation's most prominent weekly news magazines featured cover stories on e-commerce and Internet-based issues. It was government sponsored research at the National Science Foundation and other Federal agencies that launched today's information revolution. She also noted NSF's role in generating cell-phones, fiber optics and computer-assisted designs. An additional benefit of government funding of basic research is many scientists trained with the support of NSF often move on to the private sector and transfer their new insights to industry. Director Colwell testified innovation predominately comes from publicly supported research and that nearly two-thirds of the papers cited on recent U.S. Patents were published by organizations primarily supported by public funding. Director Colwell's last point was that through NSF's partnerships with more than 1,500 companies, the knowledge gained by publicly funded basic research is disseminated throughout our economy. To close her testimony she stated that with Congress' continued support of basic research, the next 50 years promise to bring even more innovations and prosperity to all Americans.

Dr. Ulaby testified the basic research performed two decades ago is at the very core of the intellectual and technological creativity responsible for the economic boom of the 1990s. He stated the University of Michigan responded to the enactment of the Bayh-Dole Act by creating formal mechanisms for commercializing technologies developed by the University's faculty. The University now spends over $500 million dollars per year on research, 65 percent of which is from federal sponsors. He noted, however, the goal of their tech transfer program is to get new knowledge to the private sector so experts can apply the knowledge in business. One of the

most important features of federal funded research programs, he said, is the "talent transfer" of educated scientists from universities to the private sector. He closed his statement by stating that resolute federal support for basic research should be a fundamental principle of the government-university partnership.

Professor Stern discussed the findings of a study he conducted with Michael Porter of Harvard Business School. According to the findings of this study the United States risks losing its competitive advantage if it continues to under-fund programs that lead to innovation and prosperity. The findings of this study were published by the American Enterprise Institute in a publication entitled "The New Challenge to America's Prosperity: Findings from the Innovation Index." The index is based on a statistical model incorporating distinct drivers of innovation capacity, including such factors as research and development personnel and investment, the composition of research and development funding and performance, and policy instruments, such as the strength of intellectual property and openness to international competition. Historically the United States has ranked high on the Index and as a result has had a high level of technological innovation. However, Professor Stern is concerned the United States may be living off historical assets. He recommended the Federal Government support higher levels of research and development funding, improve and increase the country's dwindling pool of scientists and engineers, and help create new intellectual property tools which address new forms of innovative output.

Dr. Hirsch, testified the U.S. pharmaceutical industry leads the world due to the Federal Government's long-term support for basic research. Funding basic research is a win-win situation because not only does the research generate new medicines for patients, but also creates a broad range of jobs for Americans. The success of the industry is due to federal support of research, our free and competitive markets, effective intellectual property protection, and an efficient regulatory system. Dr. Hircsh closed his testimony by stating that it takes a pharmaceutical company approximately 15 years and 500 million dollars to bring new medicine to the marketplace. Government funding of basic research provides important seeds from which innovative new health care advances ultimately grow to the benefit of all.

4.2(n)—Plant Genome Science: From the Lab to the Field to the Market, Part II

October 5, 1999

Hearing Volume Number 106–60

Background

On October 5, 1999, the Subcommittee on Basic Research held the second in a series of hearings to review federal funding for plant genome research, the role of the Federal Government in supporting plant genome research, and the potential impact of this research on agriculture and the marketing of agricultural products.

Witnesses before the Subcommittee included: Dr. Michael Thomashow, Professor of Plant and Soil Science, Michigan State

University; Dr. Rebecca Goldburg, Director of Biotechnology Programs, Environmental Defense Fund; Dr. Abigail A. Salyers, Professor of Microbiology, University of Illinois; Dr. Anthony M. Shelton, Professor of Entomology, Cornell University; Dr. R. James Cook, Professor of Plant Pathology, Washington State University.

Summary of hearing

Dr. Thomashow's testimony highlighted a number of current and expected applications of agricultural biotechnology. All of the applications were based on, applications he listed under the following three categories: (1) improved crop production and quality; (2) improved health; and (3) alternative non-food uses. He described a few of these advancements in detail, starting with herbicide resistance, which he explained was aiding farmers and allowing safer and more environmentally friendly herbicide usage.

Dr. Goldburg made two major points in her testimony: (1) she expressed her view that there are legitimate concerns about risks of transgenic crops and (2) the benefits of the technology for the current generation of genetically engineered crops were often overstated. She then listed and described a number of specific concerns, including: (1) the potential for allergenic proteins to be introduced into genetically engineered food; (2) the evolution of pests that are resistant to pesticides produced by genetically modified plants; (3) harm to non-target species, such as the Monarch butterfly, by these pesticides; and (4) antibiotic resistance generated by the "marker" genes used in the creation of genetically engineered plants.

In her testimony, Dr. Salyers dismissed the risk of antibiotic resistance genes moving into human or animal intestinal bacteria from ingested biotech foods as extremely small and of questionable medical significance. She commented, however, that the focus on the incredibly small possibility of this type of transfer had distracted officials in Europe, causing them to make an extremely ill-advised decision regarding the use of a specific antibiotic in agriculture. She also discussed her perspective on the real reasons behind the anti-biotech sentiment of activists, saying their main aim "seems to be to destroy the biotech industry and return to organic farming." She pointed out the irony of their position in that organically grown plants have a number of potential safety problems yet are virtually unregulated. In contrast, she said, genetically engineered plants are safer because the process involves making specific, targeted, and well-understood changes to a plant and the plants must then pass rigorous testing for safety.

Dr. Shelton's testimony focused on concerns raised by data published recently in scientific journals that suggested biotech crops pose a danger to the Monarch butterfly and these crops would speed up the development of pesticide resistance. He said anti-biotechnology activists have used preliminary results for political purposes.

Dr. Cook's testimony focused on environmental issues surrounding the use of genetically modified crops, and he made four main points: (1) genetic modification of plants for food, agriculture and the environment is nothing new; (2) use of plants as crops for the production of food, fiber and other products has an amazing record of environmental safety; (3) environmental risks that have

been associated with crop plants are all consequences of management practices that can be alleviated through the use of biotech plants; and (4) extensive performance trials and institutional reviews conducted by the developers of biotech crops adequately assure their safety.

4.2(o)—Plant Genome Science: From the Lab to the Field to the Market, Part III

October 19, 1999

Hearing Volume Number 106–60

Background

On October 19, 1999, the Subcommittee on Basic Research held the third in a series of hearings to review federal funding for plant genome research, the role of the Federal Government in supporting plant genome research, and the potential impact of this research on agriculture and the marketing of agricultural products.

Witnesses before the Subcommittee included: Dr. Sally L. McCammon, a Science Advisor at the Animal and Plant Health Inspection Service of the U.S. Department of Agriculture; Dr. Janet Anderson, Director of the Bio-Pesticide and Pollution Prevention Division of the Environmental Protection Agency; Dr. James Maryanski, Biotechnology Coordinator for the Center for Food Safety and Applied Nutrition at the Food and Drug Administration; Mr. Mark Silbergeld, Co-Director of the Washington Office of Consumers Union; and Dr. Stephen Taylor, Professor of Food Technology at the University of Nebraska.

Summary of hearing

Dr. McCammon described USDA's role in regulating genetically modified plants, which she described as being rooted in the 1986 Coordinated Framework for the Regulation of Biotechnology. The Framework forms the foundation for Federal regulatory policy regarding agricultural biotechnology and is based on the premise that the risks associated with organisms created using biotechnology are not fundamentally different than those associated with organisms modified by other genetic techniques, such as traditional breeding programs. Dr. McCammon stressed the importance of science in informing the regulatory process, and identified the success of the current regulatory system for biotechnology as being that the agencies involved have established credibility and scientific expertise.

Dr. Andersen explained in her testimony EPA's jurisdiction under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) is limited to pesticidal substances. According to a 1994 EPA document, the substances plants produce for protection against pests and disease are pesticides. EPA will begin the process of establishing data requirements and testing guidelines for plant pesticides when it completes the rulemaking process. Dr. Andersen also discussed the potential threat of plant pesticides to non-target species and insect resistance management programs.

Dr. Maryanski described FDA's legal authority over genetically engineered foods as falling under the Federal Food, Drug, and Cos-

metic Act, and said bio-engineered foods must adhere to the same standards of safety as conventionally derived ones. Dr. Maryanski stressed FDA's policies in regulating biotech foods are science-based and were developed through careful consideration of new developments in biotechnology.

Mr. Silbergeld described a number of food safety concerns in his testimony, including: (1) the potential for new allergenic foods; (2) the potential for toxic new foods; (3) the possibility of lower-nutrient foods; (4) environmental concerns; and (5) risks associated with antibiotic marker genes. Mr. Silbergeld asserted that FDA's guidelines for assuring the safety of biotech foods are inadequate and foods created using biotechnology should be labeled as such.

In his testimony, Dr. Taylor endorsed the concept of substantial equivalence as a part of the safety evaluation of foods derived through genetic modification, pointing out it has been recognized as an integral component of the safety assessment of biotech foods by scientific and regulatory experts from the U.S. and abroad. In addition, he said, biotech foods are subjected to extensive testing. This testing focuses most closely on the novel components in these foods, and as such is much more likely to yield helpful results.

4.2(p)—The Turkey, Taiwan, and Mexico Earthquakes: Lessons Learned

October 20, 1999

Hearing Volume Number 106–67

Background

On October 20, 1999, the Subcommittee on Basic Research held a hearing on the National Earthquake Hazards Reduction Program's (NEHRP) post-earthquake research and evaluation activities. The purpose of this hearing was to assess the current status of the Federal Government's post-earthquake research efforts and to discuss what has been learned through this program over the past several years. Among other topics, the Subcommittee explored NEHRP's recent post-earthquake research in Turkey, Mexico and Taiwan.

Witnesses before the Subcommittee included: Mr. Waverly Person, Director, National Earthquake Information Center (NEIC), United States Geological Survey, United States Department of the Interior, Denver, Colorado; Professor Thomas O'Rourke, Earthquake Engineering Research Institute, Professor of Engineering, Department of Civil & Environmental Engineering, Cornell University, Ithaca. New York; Professor Terry Wallace, Ph.D., President, Seismological Society of America, Professor of Geosciences, Department of Geosciences, University of Arizona, Tuscon, Arizona; Battalion Chief Michael Tamillow, Fairfax County Fire and Rescue Service, Fairfax County, Virginia.

Summary of hearing

Director Person testified by describing the functions of the NEIC. Mr. Person gave examples of the Center's work during and after the Turkey and Taiwan earthquakes and noted in terms of reacting to earthquake disasters, time is of the essence. In terms of the need

for improved earthquake monitoring technology, Mr. Person compared and contrasted the information generated after the Turkey and Taiwan earthquake. In Turkey it took almost two full days to calculate the extent and intensity of the earthquake. By contrast, in Taiwan, the location, depth, and magnitude of the earthquake were computed with 102 seconds. As a result, rescue activities after the Taiwan earthquake could commence quickly after the earthquake. Mr. Person testified the USGS is now in the process of installing similar technology in California so if and when an earthquake strikes California, the NEIC will be able to process information as quickly as was done in Taiwan.

Professor O'Rourke testified the two most pervasive images and lessons from the Turkey and Taiwan earthquakes are the thousands of failures of non-ductile concrete buildings and the extensive surface faulting that ruptured and destroyed critical infrastructure. He noted the United States' inventory of buildings includes a significant percentage of similarly constructed "non-ductile concrete buildings." He also stated in the United States a large number of public schools and other public institutions are located directly on fault lines and therefore are at heightened risk if an earthquake were to cause serious surface rupture. He stated the two most important lessons learned over the last few years are to support federal projects, such as FEMA's Project Impact that deal with mitigation, and to continue to research issues such as those that will lead to improved technologies for retrofitting existing structures.

Professor Wallace testified although the recent earthquakes have made the newspapers due to the fact they have been located in densely populated areas, the recent period has not been extremely unusual in terms of worldwide earthquake activity. On average, he stated, there are 15–18 earthquakes of magnitude 7.0 or larger each year. On average earthquakes kill approximately 20,000 people each year. In fact in 1990 one earthquake killed 50,000 people in Iran. As for the recent earthquakes, Professor Wallace was quick to point out the fault located in Turkey is similar to the San Andreas Fault in California. He also discussed a few of the new findings based on recent studies concerning the size of the area effected by a given earthquake. Based on those findings, he stated the United States would see similar problems if a major earthquake were to strike California. Professor Wallace closed his testimony by stating basic research as funded through the NEHRP program has been vital to understanding earthquakes. He said seismology is a data-driven science and therefore there is a real need for the kind of basic research performed during post-earthquake research.

Chief Tamillow testified responding to a catastrophic earthquake is a daunting undertaking. He stated the research conducted by FEMA over the last ten years has generated significant improvements in his organization's ability to complete its tasks. He stated post-earthquake research is important because most people will be saved during the first few hours after an earthquake and that the information gained during post-earthquake research translates into more saved earthquake victims. In addition, he stated research is important in terms of logistics and in determining the extent of the disaster caused by an earthquake.

4.2(q)—Education Research: Is What We Don't Know Hurting Our Children?

October 26, 1999

Hearing Volume Number 106–65

Background

On October 26, 1999, the Subcommittee on Basic Research held a hearing to examine the current state of education research, including the impact of recent developments in fields such as neuroscience, cognition, and developmental psychology on education policy and classroom practices. The Subcommittee also examined the Interagency Education Research Initiative (IERI), a new program developed by the National Science Foundation (NSF), the Department of Education (DOEd), and the National Institutes of Health (NIH). The IERI was established to coordinate education research efforts, and a recent National Resource Council report on education research entitled Improving Student Learning: A Strategic Plan for Education Research and Its Utilization.

Witnesses before the Subcommittee included: Dr. Judith S. Sunley, the Assistant Director for the Directorate for Education and Human Resources at the National Science Foundation; Dr. C. Kent McGuire, Assistant Secretary for the Office of Educational Research and Improvement (OERI) at the U.S. Department of Education; Dr. G. Reid Lyon, the Chief of the Child Development and Behavior Branch of the National Institutes of Health's National Institute of Child Health and Human Development (NICHD); Dr. Alexandra K. Wigdor, the Associate Executive Director for the Commission of Behavioral and Social Sciences and Education at the National Research Council; and Dr. Maris Vinovskis, a Professor of History and Public Policy at the University of Michigan.

Summary of hearing

Dr. Sunley addressed the overall state of education research, calling it "mixed but improving." She described the various programs at NSF that are focused on education research or have a research component. These include: (1) the Research in Education Policy and Practice, which funds research across a spectrum of science, mathematics, engineering and technology education; (2) special and targeted awards; (3) the Learning and Intelligent Systems (LIS) and Knowledge and Distributed Intelligence (KDI) programs; and (4) the Interagency Education Research Initiative (IERI), which NSF participates in with DoEd and NIH. The IERI program provides grants to researchers in order to perform education-related research. NSF provided approximately two-thirds of IERI's support in FY 1999.

Dr. McGuire's testimony focused on OERI's education research programs, which he said fell into three broad categories: (1) Promoting school reform and improvement; (2) assisting teachers and administrators; and (3) helping policymakers reach informed decisions. In discussing some of the crosscutting themes associated with education research at DoEd, Dr. McGuire pointed to research into early childhood development and education, children who are

at risk of educational failure, and achievement in literacy, mathematics, and science.

Dr. Lyon began his testimony by providing an overview of education research efforts at NICHD, describing the research there as being multidisciplinary and focused on identifying: (1) the critical environmental, experiential, cognitive, genetic, neurobiological, and instructional conditions that enable students to learn; (2) the risk factors that predispose some children to learning difficulties; and (3) instructional practices that foster optimal reading development. Dr. Lyon stressed that these initiatives, which have been underway for 34 years, were developed and designed in close collaboration with the scientific community.

Dr. Wigdor's testimony focused on a proposal by the National Research Council for a Strategic Education Research Plan (SERP). This plan is undergirded by three major propositions: (1) there is an emerging science of learning that has important implications for curricula design, instruction, assessment, and learning; (2) researchers, educators, and policymakers can work together in a partnership that can improve the effectiveness of all; and (3) the time is right for the initiative.

Like most of the other panelists, Dr. Vinovskis expressed the view that most education research has not been of high quality, saying academics in the other behavioral and social science disciplines "frequently regard educational research and evaluation as second-rate methodologically and conceptually." He listed a number of shortcomings and limitations in the current educational research efforts at DoEd, including a lack of intellectual leadership. In suggesting improvements, Dr. Vinoskis cited the need for OERI to be politically independent, and to work more closely with scientific agencies such as NSF and NIH on education research initiatives.

4.2(r)—National Science Foundation FY 2001 Budget Authorization Request, Part I: Research and Related Activities and Major Research Equipment

February 16, 2000

Hearing Volume Number 106–80

Background

On Wednesday, February 16, 2000, the Subcommittee on Basic Research held a hearing to review a portion of the National Science Foundation's (NSF) budget request for FY 2001. The Subcommittee heard testimony from the National Science Foundation and the National Science Board (NSB).

Witnesses appearing before the Subcommittee included: Dr. Rita Colwell, Director, National Science Foundation; and Dr. Eamon Kelly, Member, National Science Board.

Summary of hearing

Dr. Kelly raised the concern that only 2.8 percent of GDP was spent on research and development. He stated although NSF funding only supports four percent of annual R&D funding, the NSF is a silent partner in our Nation's economy due to the relationship between long-term basic research and economic progress.

Dr. Colwell noted, if enacted, this year's increase in the NSF budget would double the largest increase in the Foundation's history. Dr. Colwell discussed the foundation's major initiatives: the Information Research Initiative, Biocomplexity, the 21st century Workforce and the Nanoscale Science and Engineering Initiative. She also discussed two new Major Research Equipment accounts, the NEON Project and the EarthScope project. In closing she stated the best way to start NSF's next fifty years would be to enact this year's budget request.

4.2(s)—National Science Foundation FY 2001 Budget Authorization Request, Part II: Education and Human Resources

February 29, 2000

Hearing Volume Number 106–80

Background

On Wednesday, February 29, 2000, the Subcommittee on Basic Research held a hearing to review the National Science Foundation's (NSF) FY 2001 budget request for the Foundation's Education and Human Resources directorate. The Subcommittee heard testimony from representatives from the National Science Foundation, Johns Hopkins University and the University of Chicago.

Witnesses appearing before the Subcommittee included: Dr. Judith Sunley, Acting Assistant Director for the Directorate for Education and Human Resources, National Science Foundation; Dr. James E. K. Hildreth, Professor and Associate Dean, Johns Hopkins School of Medicine; and Dr. Bennett Bertenthal, Professor, University of Chicago.

Summary of hearing

Dr. Sunley stated the budget request for NSF's Education and Human Resources directorate is $729 million for FY 2001, with an additional $31 million coming from H–1B visas. She stated the directorate's work with NSF's 21st Century Workforce initiative assigns high priority to advancing research on learning and education and linking it to the development of information technologies as well as to educational models for our schools. She stated the Centers for Learning and Teaching will begin on a prototype basis this year with the intent of establishing five to seven centers in 2001. Associate Director Sunley noted the importance of the Graduate Teaching Fellows in K–12 Education and stated that the Distinguished Teaching Scholars Program is true intellectual seed-corn. In closing, she stated the EHR directorate and its programs reach 120,000 people every year, who in turn influence millions of people.

Dr. Bertenthal made three major points in his testimony: (1) More funding is needed for education research activities; (2) more fundamental research on child development is necessary; and (3) NSF is uniquely positioned to facilitate this research. Dr. Bertenthal suggested that unlike hospital emergency rooms that have been transformed over the past one hundred years, little has changed in the classroom. He stated NSF's interdisciplinary activities are perfect for bringing together the various researchers who

deal with child research so that progress can be made on this important issue.

Dr. Hildreth opened his testimony by discussing Johns Hopkins University's success in attracting outstanding minorities to their MD and Ph.D programs. He also discussed the relationship between Johns Hopkins and Dunbar High School and the importance of NSF's funding of graduate students as teaching fellows in K–12 settings. He stated this relationship will help both the young students at Dunbar and also the teaching fellows. He stated that the teaching fellows, who are wonderful content resources, are a terrific addition to high school classrooms in which most teachers are overburdened. In closing he stated NSF's funding of programs, such as the one at Dunbar High School will have lasting effects on the progress of science and education in the country.

4.2(t)—National Science Foundation FY 2001 Budget Authorization Request, Part III: A View From Outside NSF

March 15, 2000

Hearing Volume Number 106–80

Background

On Wednesday, March 15, 2000, the Subcommittee on Basic Research held a hearing to get an outsider's view of the National Science Foundation's (NSF) FY 2001 budget request and to consider issues related to a two-year authorization. NSF's current authorization expires at the end of FY 2000. This hearing was part of a series of hearings and meetings held by the Subcommittee regarding the NSF Budget Authorization Request.

Witnesses appearing before the Subcommittee included: Dr. Cornelius Sullivan, Vice Provost for Research, University of Southern California; Dr. Neil Evans, Director of the NorthWest Center for Emerging Technologies at Bellevue Community College, Bellevue, Washington; Dr. Ruben G. Carbonell, Co-Director, NSF Science and Technology Center for Environmentally Responsible Solvents and Processes, North Carolina State University; and Dr. Paula Stephan, Professor, School of Policy Studies, Georgia State University.

Summary of hearing

Dr. Sullivan stated NSF funding is a true investment in our Nation's future because it contributes to greater understanding, innovation, discovery, and the ability to solve complex problems. Collectively, these assets contribute substantially to our economic strength and to the defense of our Nation in the broadest of terms. Further, he stated continued investments such as this are essential to build and maintain a leadership role for the United States in the ever more globalized environment we face in the new century. He noted NSF accounts for only 4 percent of the federal R&D budget, but it supports 50 percent of the non-medical basic research housed at our colleges and universities. Dr. Sullivan acknowledged he was a bit concerned about several aspects of the initiatives, including the IT program, as currently structured. He recommended Con-

gress and the NSF should consider at least doubling the average award allocated per investigator under this program.

Dr. Evans opened his testimony by stating technology is transforming the U.S. economy, creating a "New Economy," based on innovation and brainpower. He stated the overall demand for information technology (IT) workers far outstrips the supply. More than half of these IT jobs can be staffed by technicians and technologists, with only a 2-year community college Associate degree. To meet the demand for greater supply, quality and diversity of the IT workforce, the NorthWest Center for Emerging Technologies (NWCET) was created in September 1995. Major funding for this center was provided by the National Science Foundation's (NSF) Advanced Technology Education (ATE) Program and several corporate partners (Microsoft Corporation, The Boeing Company, and other regional businesses). He stated the center is an excellent example of the work funded by NSF. In closing, he stated the Nation's community colleges support NSF's budget request.

Dr. Carbonell testified that NSF finds itself in a crucial position to influence the future economic growth and competitiveness of the United States in the global markets of the 21st century. He also stated only the Federal Government is in a position to fund basic research programs. The private sector has a much narrower focus for its research objectives. Corporate support for academic research tends to be aimed at two or three-year development plans for a particular existing product line or business unit. Even though there is a constant demand from the corporate world for a well-trained and diverse work force and novel research equipment, it is not likely that significant funds will ever be forthcoming from industrial sources for these purposes. Dr. Carbonell concluded by stating NSF's goals are at the heart of the Nation's needs for basic scientific research to provide for economic growth and national defense, and they certainly are worthy of additional support.

Dr. Stephan stated a key component of the FY 2001 NSF proposed budget is funding to extend the average duration of an award from three to four years. She strongly supported this proposal and sees it as a way by which the quality and quantity of research output per dollar invested can be increased, thus contributing to even greater economic growth. She noted that there are three mechanisms by which graduate students in the United States are generally supported: (1) Graduate Research Assistantships; (2) Fellowships; and (3) Training Grants. She stated these mechanisms are key components of principal investigator-initiated research projects. She stated these mechanisms are excellent methods of supporting graduate education and they send signals that reflect the interests and career goals of the next generation of scientists—not the generation training them. This in turn provides the opportunity for reforming the educational system, as programs work to attract fellowship holders and strive to develop training grants that pass the muster of peer review.

4.2(u)—The Internet, Distance Learning and the Future of the Research University

May 9, 2000

Hearing Volume Number 106–81

Background

This hearing examined the potential impact that the growth of Internet-based distance learning may have on our Nation's education system, particularly its impact on the country's research universities. The hearing also addressed the pros and cons of Internet-based education, how universities are reacting to the growth of distance learning, whether widespread use of Internet-based education will lead to fundamental changes in our nation's research universities, and what should be the response of science funding agencies (particularly the National Science Foundation).

Witnesses appearing before the Subcommittee included: Dr. Nils Hasselmo, President, American Association of Universities; Professor Richard Larson, Director, Center for Advanced Educational Services, Massachusetts Institute of Technology; Carol Vallone, Chief Executive Office & President, WebCT, Inc.; and Dr. James Duderstadt, Director, Millenium Project, University of Michigan.

Summary of hearing

Dr. Hasselmo opened his testimony by noting the advent of digital distance education allows education to be delivered at any time, permitting the instructor to post educational content on a web site which the student may access at a time optimal for the student. But a great deal of Internet-based education is not "distant" at all, but involves the intermingling of digital content with other orally delivered or paper-based content in traditional residential educational settings. He also noted that although there has been a great deal of speculation about the potential cost reductions that might occur from the use of information technology in education, the initial experience has been the opposite: the costs to develop, deliver, and receive digital distance education are quite high. The high cost of developing comprehensive, high-quality digital course packages is one of the principal factors driving the creation of consortia of institutions brought together to develop joint digital distance education programs. He stated there were four things the Congress could do to improve distance learning: (1) fund research for high-performance networks and applications; (2) support pilot programs for distance learning; (3) modify and update the Copyright Law; and (4) support database protection legislation.

Professor Larson noted we are at the start of a transition that will provide students and faculty with new networked opportunities for collaborative learning and research. He stated the transition may be analogous to that experienced over the 20th Century in the electric power industry and in the telephone industry. Where once these services were very local, they now encompass huge national networks. He noted there is some confusion between the terms "distance learning" and "technology-enabled education." *Technology-enabled education* (TEE) is education that is enhanced and

improved as a result of technology. The technology does not drive the education, rather students' learning needs. TEE allows educational environments and opportunities not possible before the technology was in place. Intellectually, TEE is more important than distance learning. In fact, many teaching/learning environments first developed as TEE projects for on-campus use can be relatively easily exported in a distance learning mode. In that sense, distance learning is almost a "subset" of TEE. He stated there are many potential federal roles in this exciting new field. He offered the following for suggestions for consideration: (1) Support more research on technology-enabled education, focusing on what works and what doesn't work; (2) Encourage and support novel and compelling learning networks between cooperating institutions of higher education; (3) Examine the federal role in the support of life-long learning, leading to actions that would encourage the creation of a learning society; and (4) Support efforts to narrow or eradicate the "digital divide."

Ms. Vallone stated demand for online teaching and learning resources would not be booming if Internet-based education and distance learning did not offer dramatic benefits. They can widen access to higher education, improve the quality of teaching, and leverage an institution's existing infrastructure. She also stated the National Science Foundation is responding well to these rapidly changing times. She concluded her prepared remarks with a quotation from John Chambers, the CEO of Cisco Systems. He told The New York Times last November, "The next big killer application for the Internet is going to be education. Education over the Internet is going to be so big it is going to make e-mail usage look like a rounding error."

Dr. Duderstadt's testimony concerned exploring the implications of rapidly evolving information technology for the future of the American research university. He stated that today our society and our social institutions are being reshaped by the rapid advances in information technology-computers, telecommunications, and networks. These rapidly evolving technologies are dramatically changing the way we collect, manipulate, and transmit information. They change the relationship between people and knowledge, and they are likely to reshape in profound ways knowledge-based institutions such as the research university. While this technology has the capacity to enhance and enrich teaching and scholarship, it also poses certain threats to the university. We can now use powerful computers and networks to deliver educational services to anyone, anyplace, anytime, no longer confined to the campus or the academic schedule. Technology is creating an open learning environment in which the student has evolved into an active learner and consumer of educational services, stimulating the growth of powerful market forces that could dramatically reshape the higher education enterprise.

4.2(v)—The State of Ocean and Marine Science

July 27, 2000

Hearing Volume Number 106–100

Background

The purpose of this joint hearing with the Subcommittee on Energy and Environment was to review federal support for the Ocean Sciences. Topics of the hearing included: ocean research activities supported by the National Science Foundation (NSF) and the National Oceanic and Atmospheric Administration (NOAA), the Academic Fleet and the University-National Oceanographic Laboratory System (UNOLS), and other issues of concern to the ocean research community.

The Subcommittee received testimony from Admiral James Watkins, President, Consortium for Oceanographic Research and Education (CORE); Dr. Robert Knox, Associate Director, Scripps Institution of Oceanography and Chair, University-National Oceanographic Laboratory System (UNOLS) Council; Dr. James Delaney, Professor of Oceanography, University of Washington; and Dr. Jack Sobel, Center for Marine Conversation.

Summary of hearing

Admiral Watkins opened his testimony by noting the importance of ocean research given that more than half of the world's population lives in the 2 percent of the Earth's surface that is coastal zone. He noted there are increasing concerns about the biological health of the oceans. Watkins also explained the importance of ocean research in understanding the development and effects of natural disasters, including hurricanes, monsoons, typhoons and tsunamis. In addition, Watkins noted the important role the oceans play in the realm of national defense. He suggested that a system of sustained integrated ocean observations would address fundamental scientific questions regarding the interacting physical, biological, chemical and geological processes in the oceans, and their relationship to the human population that relies on them. Watkins testified that building on the existing infrastructure, a multi-sector commitment involving the Federal Government, State governments, the private sector and academia, lead to a national capability within 10 years.

Dr. Knox testified on the current status of UNOLS. He noted UNOLS is a successful system yielding highly cost-effective seagoing capability for the U.S. ocean science community. In addition, he explained that the question of how to renew the UNOLS fleet in concert with a long-range view of scientific requirements—including a realistic view of funded future uses for the fleet—confronts agencies, UNOLS institutions, and several Committees of Congress. With intelligent cooperation, he noted, we can plan this future well, enhancing the UNOLS fleet. He believes the Federal Oceanographic Facilities Committee (FOFC) with its new reporting relationship to the National Ocean Research Leadership Council bodes well for a new round of fleet renewal planning. He urged

Congress to resist altering the "roadmap" FOFC and UNOLS have created in funding research in oceanography.

Dr. Delaney made three points in his testimony: (1) the tide is rising in the world of oceanographic research; (2) life exists deep within our planet and perhaps within others; and (3) we are on the threshold of a new type of Interactive Oceanography. Delaney provided a view of his research of volcanically supported biospheres on the ocean floor. He proposed further research projects similar to his NEPTUNE project, an undersea observatory based on electro-optical networking that connects through the Internet to many remote, interactive natural laboratory nodes. These labs would be designed for real-time, four-dimensional experiments on, above, and below the sea floor. He noted this type of research represents the shift, in his view, of ocean research from an exploratory-based model to an understanding-based model.

Dr. Sobel testified on the current state of coral reef science. He explained our current knowledge of coral reefs is sufficient to state unequivocally they are among the most biologically diverse biosystems on earth, they possess high value to human beings if properly preserved, they face a number of serious stresses that have the potential to cause greater impacts over the next several decades, they face a number of well-documented threats, and the application of existing management tools can limit the impacts of these threats and stresses. He noted the U.S. Coral Reef Task Force and its National Action Plan to Conserve Coral Reefs represent the best opportunity to protect coral reefs, and urged further funding of these projects.

4.2(w)—Beyond Silicon-Based Computing: Quantum and Molecular Computing

September 12, 2000

Hearing Volume Number 106–91

Background

The purpose of the hearing was to review federally funded research of quantum and molecular computing, to discuss the role of the Federal Government in supporting further research, and to discuss the economic implications of advances made in the field of non-silicon-based computing.

The Subcommittee received testimony from Dr. Ruzena Bajcsy, Assistant Director, Computer, Information Science, and Engineering (CISE) Directorate, National Science Foundation; Dr. Charles H. Bennett, IBM Research Fellow; Dr. Laura Landweber, Assistant Professor, Dept. of Ecology & Evolutionary Biology, Princeton University; Dr. Timothy Havel, Lecturer, Biological Chemistry and Molecular Pharmacology, Harvard Medical School, Affiliate, Department of Nuclear Engineering, Massachusetts Institute of Technology

Summary of hearing

Dr. Bajcsy stated today's research into non-silicon based computing has the potential to revolutionize every facet of our lives. The NSF is particularly well suited to support research in these

areas. NSF's Initiatives in Information Technology Research and in Nanoscale Science and Engineering provide mechanisms to address the interdisciplinary research that these ideas require. In her comments, she addressed five general points. First she gave a brief overview of the science and engineering challenges and accomplishments to date. Then she spoke about four aspects of the federal role in these exciting new areas: how the NSF is supporting and coordinating this research, multi-agency activities and coordination, the relationship of federally supported research with industry, and lastly, international activities in these areas. In closing she noted this is a high-risk, high-payoff field, and many years of basic research into new hardware and software technologies will be needed to unlock the potential of this science and technology. Quantum, chemical and DNA computing are all radically different approaches to information science and technology. They offers the possibility of new paradigms in computation and data processing, data storage and transmission, cryptography and information security, as well as new quantum-based technologies.

Dr. Bennett noted quantum information science draws on the disciplines of physical science, mathematics, computer science, and engineering. Its aim is to understand how certain fundamental laws of physics can be harnessed to improve dramatically how we transmit and process information. This is not research that will get done in the private sector. Industrial R&D cannot replace government investment in long-term fundamental research. Federal and private research are largely complementary, not overlapping, activities. If there is a lesson about technology that the twentieth century has taught us, it is that technology leadership has a huge and beneficial impact on the welfare of our society and national security. One need only look at our current economic prosperity or at how few lives were lost in the Desert Storm campaign to have ample evidence of this truth. Stepping up our national investment in quantum information science will do much to help insure our technological preeminence in the century that lies ahead of us.

Dr. Havel testified today's computers are the enabling technology that could provide a breakthrough in our ability to deal with complex systems, ranging from the quantum to the biological. At the present rate computer circuitry will reach atomic dimensions within the next 10 to 15 years, at which point dealing with, and taking advantage of, quantum complexity becomes inevitable. In particular, researchers have shown a quantum computer could simulate other quantum systems in subexponential time, thereby ensuring current progress will continue far into the foreseeable future. It should be understood that molecular and quantum computing are about more than just getting the silicon out of computers. They are about entirely new architectures and even paradigms for computation, which will lead to machines that differ from today's computers not merely in degree, but fundamentally in kind.

Dr. Landweber opened her testimony by stating ever since scientists discovered conventional silicon-based computers have an upper limit in terms of speed, they have been searching for alternate media with which to solve computational problems. That search has led us, among other places, to DNA. The advantage of DNA is that it is tiny, cheap, and can react faster than silicon.

Since this fledgling field is only six years old, it is difficult to guess at this stage what applications it may ultimately have. For now it is a terrific example of basic research, bringing together researchers from two traditionally disparate fields—computer science and biology—to find new approaches to doing creative science. Developing this field will require basic research on all fronts to expand its impact on both computer science and molecular biology, with particular attention to training and educating individuals in more than a single discipline of science. Because this field is still so new, nourishing it at this stage could indeed alter its course as well as shape its next leaders that will build upon the current level of progress in the future.

4.2(x)—Benchmarking U.S. Science: What Can It Tell Us?

October 4, 2000

Hearing Volume Number 106–102

Background

The purpose of this hearing was to examine the use of international benchmarking to determine the standing of U.S. efforts in various research fields. The Subcommittee heard testimony from Dr. Eamon Kelly, Chairman of the National Science Board; Dr. Marye Anne Fox, Chancellor, North Carolina State University; and Dr. Robert M. White, Professor and Director of the Data Storage Systems Center at Carnegie Mellon University.

Summary of hearing

In her testimony, Dr. Fox explained how the Committee on Science, Engineering, and Public Policy (COSEPUP), a committee of the National Academies, embarked on its experiments in benchmarking as a result of their 1993 report, Science, Technology, and the Federal Government: National Goals for a New Era. That study, she said, set two goals: (1) "the United States should be among the world leaders in all major areas of science," and (2) "the United States should maintain clear leadership in some major areas of science." Dr. Fox explained that COSEPUP decided to experiment with benchmarking as means of assessing progress towards those goals. COSEPUP charged each benchmarking panel with answering three questions, she said: What is the position of U.S. research in the field, relative to that in other regions or countries? On the basis of current trends, what will be our relative position in the near and longer-term future? What are the key factors influencing relative U.S. performance in the field? Fox testified the experiments concluded benchmarking could effectively answer those questions for the fields chosen, but it might not be an appropriate technique for all fields.

Dr. White spelled out the methodology employed by the benchmarking panels. He noted each panel of experts in the field used a variety of different measures to arrive at a conclusion, including: a nominating "virtual congress" of experts in the chosen field; performing a citation analysis; examining journal publications; a quantitative data analysis; a look at prize winners in the chosen field; and an analysis of speakers at international con-

ferences. From this data, he said, it was possible to get an assessment of the standing of U.S. research in the chosen field.

In his remarks, Dr. Kelly addressed the broader policy implications of benchmarking. He noted international comparisons are valuable for understanding the strengths and weaknesses of the U.S. science and technology, and for helping to shape the appropriate role of the Federal Government in national S&T enterprise. However, he noted there is no simple solution in the form of a single methodology to guide federal decisions on research allocations. The strength of U.S. science and technology in the international context should be an important consideration in federal allocations to fields of research, he said, but they should also be weighed against the potential public benefits from investments, the health of our infrastructure for science and engineering research and education, and the opportunities and readiness for rapid advancement in specific research fields.

4.3—Subcommittee on Energy and Environment

4.3(a)—Fiscal Year 2000 Budget Authorization Request: National Oceanic and Atmospheric Administration and NOAA Fleet Maintenance and Planning, Aircraft Services, and NOAA Corps

February 24, 1999

Hearing Volume No. 106–30

Background

On February 24, 1999 the Subcommittee on Energy and Environment held a hearing entitled, "Fiscal Year 2000 Budget Authorization Request: National Oceanic and Atmospheric Administration [NOAA] and NOAA Fleet Maintenance and Planning, Aircraft Services, and NOAA Corps," to hear testimony on the justification of NOAA's Fiscal Year (FY) 2000 budget request.

Witnesses included: The Honorable D. James Baker, Under Secretary for Oceans and Atmosphere, U.S. Department of Commerce, and Administrator, NOAA; Mr. Joel C. Willemssen, Director, Civil Agencies Information Sytems, Accounting and Information Management Division, U.S. General Accounting Office (GAO), accompanied by Mr. L. Nye Stevens, Director, Federal Management and Workforce Issues, General Government Division, GAO; and Dr. Richard A. Anthes, Chair, National Research Council (NRC) National Weather Service Modernization Committee, and President, University Corporation for Atmospheric Research, Boulder, Colorado.

Summary of hearing

Dr. Baker testified NOAA's FY 2000 request is for $2.6 billion in total budget authority, which includes $2.5 billion in discretionary budget authority. This request collectively represents a 12.9% increase over the total budget authority appropriated for FY 1999, and Dr. Baker highlighted the following:

- Funding to address NOAA's data acquisition needs by providing for the first of four new Fisheries Research Vessels (FRVs) and to increase the number of days-at-sea for University-National

Oceanographic Laboratory System (UNOLS) ship time for critical data collection needs.

• Funding to maintain NOAA's supercomputing capacity at the National Weather Service (NWS) Central Computing Facility in Suitland, Maryland, and the Forecast Systems Lab (FSL) in Boulder, Colorado, while acquiring a massively parallel, scaleable computer to be located at the OAR's Geophysical Fluid Dynamics Lab (GFDL), in Princeton, New Jersey.

• Recurring lease and/or operations costs at a number of NOAA facilities coming on-line in FY 1999 and FY 2000, including the David Skaggs Research Center in Boulder, Colorado. At the same time funds are requested to complete the planning and design of a new state-of-the-art National Marine Fisheries Service (NMFS) research facility near Juneau, Alaska.

• Adjustments-to-base for pay related and inflationary cost increases to the NWS, as well as for the FY 2000 pay raise for the remaining Line Offices.

• Funding to begin to replace outdated climate/weather observing equipment in order to maintain continuity of core data and services and provides funds for continuing technology infusion for systems developed under the Weather Service Modernization.

• The Administration's intent to restructure and maintain the NOAA Corps and includes payments of retirement benefits for Commissioned Officers as mandatory funding.

• $1 million to establish educational training relationships through a joint partnership with a consortium of Historically Black Colleges and Universities (HBCU).

• Funding to accelerate the implementation of the Commerce Administrative Management System (CAMS), which is critical to meeting NOAA's financial management requirements.

Mr. Willemssen's testimony discussed the status of the NWS systems modernization, and then addressed the most cost-effective alternatives for acquiring NOAA's marine data. GAO findings included the following:

• Although the NWS is nearing completion of its systems modernization effort, two significant challenges face it this year—deploying the Advanced Weather Interactive Processing System (AWIPS), the final system of the modernization, and ensuring that all of its mission-critical systems are Year 2000 compliant. NWS has made progress on the development and operational testing of the forecaster workstations and its Year 2000 testing and contingency planning. However, cost, schedule, and technical risks associated with the workstations continue to be concerns. Further, the results of NWS' Year 2000 end-to-end testing and business continuity and contingency plans are expected to be delivered soon.

• In the NOAA fleet area, NOAA now out-sources for more of its research and data needs, but plans to spend $185 million over the next 5 years to acquire four new replacement NOAA fisheries research vessels. Continued Congressional oversight of this area, as well as NOAA's budget requests for replacement or upgraded ships, is needed to ensure that NOAA is pursuing the most cost-effective alternatives for acquiring marine data.

Dr. Anthes' testimony summarized the work to date of the NRC's National Weather Service Modernization Committee (NWSMC),

and focused on the ongoing modernization and restructuring of the NWS. The NWSMC was established under a NOAA contract executed with the NRC on December 29, 1989 to monitor the technical aspects of the modernization and restructuring of the NWS. To date, the NWSMC has completed 15 reports, three of which were letter reports—representing a total of more than 10,000 hours of volunteered time by 37 professionals from a range of science, engineering, weather and information technologies, and organizational management specialties, who provided oversight and independent advice to NOAA and the NWS during the past nine years.

At this time, the NWSMC finds the following:

- Three of the five major technical components of the modernization—the Weather Surveillance Radar-1988 Doppler (WSR–88D), more commonly referred to as the Next Generation Weather Radar (NEXRAD); the Automated Surface Observing System (ASOS); and the Next Generation Geostationary Operational Environmental Satellites (GOES–NEXT)—are in place, operational, and contributing to improved weather forecasts nationwide.
- The fourth component—the Advanced Weather Interactive Processing System (AWIPS)—has experienced delays caused by a mixture of technical and management problems, and is now being deployed in a configuration that is somewhat less capable than originally specified. However, even with its somewhat reduced capability, it provides a data integration and communications tool to the forecasters that is far superior to the old technology in use at weather offices.
- The fifth component of the modernization, supercomputers at the National Centers for Environmental Prediction, are clearly deficient to meet current and climate modeling needs. A program to buy class 8 supercomputers is in place, but there needs to be a long-term commitment to periodically and regularly upgrade computers at the National Centers.

Dr. Anthes concluded his testimony by summarizing the latest NWSMC report, "A New Vision for the National Weather Service: Roadmap for the Future."

4.3(b)—Fiscal Year 2000 Budget Authorization Request: Department of Energy—Offices of Science; Environment, Safety and Health; and Environmental Management

March 3, 1999

Hearing Volume No. 106–69

Background

On March 3, 1999 the Subcommittee on Energy and Environment held a hearing entitled, "Fiscal Year 2000 Budget Authorization Request: Department of Energy—Offices of Science; Environment, Safety and Health; and Environmental Management." This was the first in a series of hearings to examine the Department of Energy (DOE) FY 2000 budget request. The Subcommittee also heard testimony from the GAO on the status of the Spallation Neutron Source (SNS) Project.

DOE's total FY 2000 request for new budget authority for its civilian energy R&D and science programs is $4.99 billion, an in-

crease of 4.2 percent over FY 1999 levels. Regarding programs solely under the jurisdiction of the Science Committee, DOE has requested $4.5 billion, an increase of 7.0 percent over the previous year.

The DOE Office of Science is the largest single entity under the Science Committee's jurisdiction and its $2.85 billion request is a 5.1 percent (or $138 million) increase over FY 1999 levels. Two items—the SNS ($84 million) and the new Scientific Simulation Initiative (SSI) ($70)—account for $154 million in increases. The DOE Office of Environment, Safety and Health (EH) Non-Defense request is $50.8 million, an increase of 7 percent. Lastly, DOE's Non-Defense Environmental Management (EM) Program $330 million request is a decrease of 23 percent, mostly due to the transfer of two Oak Ridge cleanup projects to the Defense Environmental Restoration and Waste Management appropriation account.

Witnesses included: The Honorable Martha A. Krebs, Director, DOE Office of Science; The Honorable David M. Michaels, DOE Assistant Secretary for Environment, Safety and Health (EH); Mr. Dan M. Berkovitz, DOE Deputy Assistant Secretary for Planning, Policy and Budget, Office of Environmental Management (EM); and Mr. Victor S. Rezendes, Director, Energy, Natural Resources, and Science Issues, Development Division, U.S. General Accounting Office (GAO).

Summary of hearing

Dr. Krebs testified on the $2.85 billion request from the Office of Science. Her testimony included the following:

- DOE ranks second behind the Department of Defense in terms of the investment made in science by the Federal Government.
- Background and status of the SNS, including some recent reviews of the project DOE has taken into account when planning the project.
- DOE hopes to use the Scientific Simulation Initiative to build computer and information technology for the second decade of the new century with the hope that the terascale computers developed will be used for numerous projects within DOE and the science community in general.

Dr. Michael's testimony on the $50.8 million EH non-defense budget request discussed the following:

- In 1997 DOE decided to run pilot programs to determine the costs and benefits of external regulation, and subsequently intended to submit legislation to Congress that would externally regulate certain single-purpose energy research laboratories.
- The FY 1999 Energy and Water Development Appropriations Conference Report directed DOE not to begin any pilot projects that did not include the Nuclear Regulatory Commission, the Occupational Safety and Health Administration, and other state and local bodies.
- These pilots have raised unexpected and as yet unresolved issues. With such issues outstanding, DOE does not feel comfortable in submitting single-purpose laboratory external-regulation legislation at this time. DOE, however, is still continuing with external regulation activities.

• Secretary of Energy Richardson designated the Integrated Safety Management (ISM) as the Department's safety policy and is continuing to take steps towards implementing ISM.

• EH is currently soliciting input from outside experts with the hope of addressing concerns by workers who claim that their health was put in jeopardy.

Mr. Berkovitz discussed the $330 million non-defense request for EM and said the following:

• EM is responsible for cleaning up government-related nuclear energy research facilities that have accumulated over the past 50 years. In addition, EM is tasked with maintaining the safety and security of weapons-usable plutonium and radioactive spent nuclear fuel.

• EM has set a goal of cleaning up as many sites as possible by the year 2006. There are 48 sites left (down from 53 the previous year) and EM hopes to reduce that number to 42 by the end of FY 2000.

• EM uses technological innovations to contribute to clean-up and continues to research and develop new technologies to aid in the future.

Mr. Rezendes testified on GAO review of the status of the SNS project and noted the following findings:

• DOE has not assembled a complete team with the necessary technical skills and experience to manage the project.

• The project is underspending its appropriations and has currently spent 60 percent of the planned budget.

• The project's cost and schedule estimates are not fully developed and thus do not represent a reliable estimate baseline. There is also an inadequate allowance for contingencies.

• DOE's complex management structure also creates problems for the SNS project.

• GAO reviewed 80 DOE projects from a 15-year period and found that only 15 were completed and 31 were terminated after spending $10 billion.

4.3(c)—Fiscal Year 2000 Budget Authorization Request: Department of Energy—Offices of Energy Efficiency and Renewable Energy; Fossil Energy; and Nuclear Energy, Science and Technology

March 10, 1999

Hearing Volume No. 106–69

Background

On March 10, 1999, the Subcommittee on Energy and Environment held a hearing entitled, "Fiscal Year 2000 Budget Authorization Request: Department of Energy—Offices of Energy Efficiency and Renewable Energy; Fossil Energy; and Nuclear Energy, Science and Technology." This was the second in a series of hearings to hear testimony on the justification of the DOE's FY 2000 budget request.

Witnesses included: The Honorable Dan Reicher, DOE Assistant Secretary for Energy Efficiency and Renewable Energy (EERE); Mr. Robert Kripowicz, DOE Acting Assistant Secretary for Fossil

Energy (FE); and Mr. William Magwood IV, Director, DOE Office of Nuclear Energy, Science and Technology (NE).

DOE's total FY 2000 request for new budget authority for its civilian energy R&D and science programs is $4.99 billion, an increase of 4.2 percent over FY 1999 levels. Regarding programs solely under the jurisdiction of the Science Committee, DOE has requested $4.5 billion, an increase of 7 percent over the previous year.

The FY 2000 EERE request is $1.014 billion, an increase of $175.7 million—or 21.0 percent—above the FY 1999 appropriation of $837.9 million. The FY 2000 request for FE R&D is $364.4 million, a decrease of $20.1 million—or 5.2 percent—below the FY 1999 appropriation of $384.1 million. The major decreases are $9.9 million for gas and $11.0 million for the use of prior year balances. The FY 2000 budget request for the NE under the Science Committee's jurisdiction is $269.3 million, an increase of $5.9 million—or 2.2 percent—over FY 1999

Summary of hearing

Mr. Reicher discussed the EERE budget request of just over $1 billion and claimed the following:

- Consumer savings have totaled more than $33 billion since 1978 as a result of several DOE-supported technologies, and energy-intensive industries such as steel, glass, aluminum, and paper have saved $2.1 billion because of energy-saving technologies.
- Renewable energy costs are down 80 percent since 1980.
- DOE wants to reduce energy use 50 percent in new homes and 30 percent in commercial buildings.
- The EERE budget request hopes to keep up this pace as well as reach the following goals: complete work on advanced industrial turbine; accelerate R&D for high efficiency vehicles; increase grants to states for energy work, increase weatherization funding; improve R&D on highly efficient and affordable buildings; and increase the use of coal mixed with biomass.
- Eleven percent of the Office of Power Technologies budget is earmarked, and 93 percent of the remaining funds are distributed on a competitive basis. The Office of Transportation Technologies is in the 70 to 80 percent competitive awards range and the Office of Industrial Technologies is near 100 percent.
- The next generation of turbines will allow for wind energy in the two to three cents per kilowatt hour range—down from 30 to 40 cents in 1980.

Mr. Kripowicz gave testimony justifying the $364 million budget request by the FE, which includes the following:

- FE has set as a priority the development of a virtually pollution-free power plant (named the Vision 21 Power Plant) in the 2015 timeframe. A key aspect of this project is higher efficiency resulting in lower costs and fewer emissions of greenhouse gases.
- Another priority of FE is research into carbon sequestration.
- Diversifying the future domestic supplies, including assuring adequate supplies of natural gas at reasonable prices and conducting more research into the potential of methane hydrates, is important.

• FE is also working to provide the technical assistance, including demonstrating improvements in both tools and techniques, as well as developing new technologies to keep oil flowing from the most threatened reserves, as it often costs more to pump out of the ground than it brings on the market. In most fields, only one-third or so of the oil has been produced.

• FE offered the deferral of $246 million from the Clean Coal Technology Program because only two of the 40 projects in the program still require funding.

• Approximately 10 percent of the FE budget is earmarked; the remainder is awarded competitively.

Mr. Magwood discussed the NE civilian budget request of $269.3 million, and gave the following justifications for the request:

• The U.S. remains a key international participant in the discussion over future application of nuclear technology. However, this position is in jeopardy as momentum from past accomplishments fades and the nuclear R&D infrastructure decays.

• NE's requested increase of $25 million, as well as increases requested in their university programs are geared toward keeping the U.S. in a leadership role of nuclear technology.

• NE also is proposing several new projects, including the Nuclear Energy Plant Optimization Program to ensure nuclear plants are safe and efficient over the next three decades and the Advanced Nuclear Medicine Initiative, part of the isotope program, to fight against cancer, arthritis, and other illnesses.

• NE is relying more than ever on outside advice in conducting nuclear R&D activity.

• DOE remains confident that the Electrometallurgical Treatment (EMT) project will continue after an independent review by the National Research Council even though the Administration has proposed cutting $20 million, or one-fourth, of the project's funding.

4.3(d)—Fiscal Year 2000 Budget Authorization Request: Environmental Protection Agency Research and Development

March 18, 1999

Hearing Volume No. 106–25

Background

On March 18, 1999 the Subcommittee on Energy and Environment held a hearing entitled, "Fiscal Year 2000 Budget Authorization Request: Environmental Protection Agency Research and Development," to hear testimony on the Environmental Protection Agency (EPA) FY 2000 budget request for Science and Technology (S&T).

Witnesses included: The Honorable Norine E. Noonan, EPA Assistant Administrator for Research and Development; Dr. William Randall Seeker, Chair, Research Strategies Advisory Committee (RSAC), EPA Science Advisory Board (SAB); and Mr. David G. Wood, Associate Director, Environmental Protection Issues, Resources, Community, and Economic Development Division, GAO.

Summary of hearing

Dr. Noonan testified that EPA's total FY 2000 request in the S&T appropriation account—which was created in 1996 and funds the operating programs of the Office of Research and Development (ORD), the Office of Air and Radiation's (OAR's) Office of Mobile Sources, and the Program Office laboratories—is $642.5 million and 2,456 total work years—a decrease of $17.5 million and 97 work years from FY 1999. ORD's total FY 2000 request is $534.8 million and 2,004 work years. Of this total, ORD's FY 2000 request in the S&T account is $495.9 million and 1,876 work years; the remaining $38.9 million and 128 work years are in accounts other than the S&T account to support the Superfund, Leaking Underground Storage Tank, and Oil Spills research programs.

Dr. Seeker noted that the SAB's RSAC had conducted a formal review of the entire FY 2000 EPA S&T budget request for the first time, and as part of the review process, had responded to six charge questions:

1. *Can the objectives of the research and development program in ORD and the broader science and technology programs in EPA be achieved at the resource levels requested?*—RSAC found the funding request priorities to be appropriate based on the environmental goals established in the Agency Strategic Plan, but continues to have reservations about the adequacy of the funding level given the increasing complexity and cost of environmental problems.

2. *Does the budget request reflect priorities identified in the EPA and ORD Strategic Plans?*—RSAC found that the ORD and Program Office S&T budgets do set priorities aligned with the Agency and ORD strategic plans and Government Performance and Results Act (GPRA) goals, but had some reservations about the decreases and some omissions in the overall priorities and concluded that the budgets proposed in several areas were not likely to be sufficient to meet the goals established by the Agency and ORD in their Strategic Plans.

3. *Does the budget request reflect coordination between ORD and the Program Offices?*—RSAC commended the Agency for significant improvements in the coordination between ORD projects and the needs of the program offices and found that the Agency needs to continue to build on its strategic planning process for science across the Agency and across environmental goals.

4. *Does the budget request support a reasonable balance in terms of attention to core research on multimedia capabilities and issues and to media-specific problem-driven topics?*—RSAC found that the ORD budget request does appear to provide a balance between core research and media-specific, problem-driven science needs, but noted that the overall S&T budget request is more weighted to media-specific problem driven activities.

5. *Does the budget request balance attention to near-term and to long-term research and science and technology issues?*—RSAC found that, in general, the Agency has given serious consideration to both long-term and short-term research and science and technology issues, but that there is still no overall explicit approach to incorporate the requirements of longer-term research programs within the short-term budgetary process.

6. *How can EPA use or improve upon the Government Performance and Results Act (GPRA) structure to communicate research plans, priorities, research requirements, and planned outcomes?*—RSAC found that the EPA had used the GPRA goals structure to organize its FY 2000 budget request, and welcomed such a structure as an organizing principle. However, RSAC also found that most of the science milestones were process (or "output") oriented rather than results (or "outcome") oriented; and that the ORD and Agency process for prioritizing potential research programs is not completely transparent.

Mr. Wood discussed the findings from GAO's recent report on EPA's S&T funds requested for FY 1999[1] and on its limited review of EPA's FY 2000 budget justification, including: (1) difficulties experienced in comparing EPA's S&T budget justification for FY 1999 with those of previous years; and (2) actions that EPA planned and implemented in order to improve the clarity and comparability of the FY 2000 justification, and items that need further clarification. In summary, GAO found the following:

- EPA's budget justification for FY 1999 could not be readily compared to amounts requested or enacted for FY 1998 and prior years because the justification did not show how the budget would be distributed among program offices or program components—information needed to link to the prior years' justifications.
- EPA implemented several changes to its FY 2000 justification to solve problems experienced in comparing the 1998 and 1999 budget justifications. While the budget justification followed the basic format reflecting the agency's strategic goals and objectives, EPA made changes to the objectives without explanations or documentation to link the changes to the FY 1999 budget justification. As a result, the FY 2000 budget justification cannot be completely compared with the FY 1999 justification without supplemental information.

4.3(e)—Fiscal Year 2000 Budget Authorization Request: Department of Energy—Results Act Implementation

March 24, 1999

Hearing Volume No. 106–24

Background

On March 24, 1999, the Subcommittee on Energy and Environment held a hearing entitled "Fiscal Year 2000 Budget Authorization Request: Department of Energy—Results Act Implementation." This hearing—the third in a set of hearings on DOE's FY 2000 budget request—examined whether or not the DOE is incorporating the requirements of the Government Performance and Results Act (GPRA) of 1993 in its budget request.

Witnesses included: The Honorable Gregory H. Friedman, DOE Inspector General; Ms. Susan D. Kladiva, Associate Director, Energy Resources, and Science Resources, Community, and Economic Development Division, GAO; Mr. John R. Sullivan, Director of

[1] Environmental Protection: EPA's Science and Technology Funds (GAO/RCED–99–12, Oct. 30, 1998).

Strategic Planning, Budget and Program Evaluation, DOE Office of Policy and International Affairs; and Ms. Gwendolyn Cowan, Director, Office of Procurement and Assistance Policy, DOE Office of Management and Administration.

Summary of hearing

Mr. Friedman testified on reviews conducted by the Office of Inspector General regarding DOE's implementation of GPRA and discussed the following findings and recommendations:

- The Offices of Science, NE, and EERE have not integrated their planning, budgeting, and performance measures into a unified strategy. On the other hand, the Offices of Defense Programs and of Environmental Management (EM) have performed such an integration.
- The Office of Science, NE, and EERE also had limited success in developing results-oriented performance standards while the Office of Defense Programs and EM demonstrated significant progress in this area.
- None of the aforementioned offices adequately validated the estimated and actual costs used to measure performance, which is also a requirement of the Results Act.
- The Office of Inspector General has offered the following recommendations to DOE: (1) enhance the links between the overall strategic plan and its individual program office budget request; (2) require program offices to develop performance standards that are results-oriented, clear, measurable, and tied to projected resources; and (3) require program managers to collect and validate both estimated and actual costs used in performance measures.
- DOE made significant use of the peer-review process to offset problems in defining results and performance goals in areas such as basic research.

Ms. Kladiva discussed GAO's observations concerning DOE's ability to implement GPRA, and noted the following:

- DOE's annual performance plan could be more useful if it better identified planned outcomes, presented information on individual offices' planned performance and requested funds, and described its verification and validation in more detail.
- While many of DOE's goals and measures clearly quantify planned performance, no baseline information is given, and, therefore, it is impossible to judge how much progress has been made.
- Some of DOE's annual goals and measures are vague and ambiguous and make it difficult to judge performance.
- DOE's measuring system is flawed because it allows DOE to rate incomplete work as successful.
- It is often difficult to associate an office's total planned performance with funds requested because of a complex matrix used by the Department.

Mr. Sullivan testified on DOE's efforts to comply with and implement the Results Act and discussed the following:

- The Department initiated its strategic management system in 1996 that allows it to perform the functions of planning, budgeting, program execution, and evaluation.
- The first performance agreement between the President and the Secretary was published for FY 1995 and the first annual per-

formance report was released later in 1995; 1996 brought about the release of the first annual performance plan from the Department.

• The two main challenges remaining for DOE are refining and perfecting measures so that they represent outcomes, not outputs, and ensuring that all Departmental activities, budgets, contracts, and plans clearly link to the strategic plan.

• DOE is planning on using the National Academy of Sciences report to learn how to shape and build their next strategic plan.

Ms. Cowan talked about the progress DOE had made regarding GPRA and also discussed DOE's procurement and financial assistance award activities. She noted that in 1994 the Department eliminated its unique competition policy and that competition for major contracts has been greater in the subsequent four years than in any time in the Department's history.

4.3(f)—Fiscal Year 2000 Climate Change Budget Authorization Request

April 14, 1999

Hearing Volume No. 106–15

Background

On April 14, 1999, the Subcommittee on Energy and Environment held a hearing entitled "Fiscal Year 2000 Climate Change Budget Authorization Request." This hearing examined the Administration's FY 2000 climate change budget proposals related to the Kyoto Protocol and the Protocol's requirement that the U.S. reduce its net greenhouse gas emissions by 7 percent below 1990 levels in the 2008–2012 timeframe—a reduction in projected U.S. carbon emissions of about 550 million metric tons, according to the most recent estimate of the Energy Information Administration (EIA) contained in its Annual Outlook 1999 (AEO99) report. The hearing also considered the U.S. Global Climate Change Research Program (USGCRP).

The Administration's FY 2000 climate change budget request totals $4.142 billion, which includes: (1) $200 million for an EPA "Clean Air Partnership Fund"; (2) $1.368 billion for Climate Change Technology Initiative (CCTI) spending programs; (3) $387 million for CCTI tax incentives; (4) $400 million in other climate-related programs (DOE clean coal and natural gas, weatherization, and state energy grants); and (5) $1.787 billion for the USGCRP.

Witnesses included: The Honorable Neal F. Lane, Assistant to the President for Science and Technology, and Director, Office of Science and Technology Policy; The Honorable Dan Reicher, DOE Assistant Secretary for Energy Efficiency and Renewable Energy; The Honorable David M. Gardiner, Assistant Administrator for Policy, EPA; and The Honorable Jay E. Hakes, Administrator, EIA, DOE.

Summary of hearing

Dr. Lane testified on the Administration's FY 2000 budget requests for CCTI and USGCRP, and noted the following:

• CCTI is the Administration's response to a report issued from the President's Committee of Advisors on Science and Technology

(PCAST), which concluded that the federal energy R&D programs were not commensurate in scope and scale with the energy challenges and opportunities for the 21st century. PCAST also warned that this shortfall could translate into higher dependence on imported oil, higher energy costs, smaller U.S. energy technology exports, worse air quality than would otherwise be the case, and the diminished capacity to reduce greenhouse gas emissions cost effectively.

• U.S. climate change science is largely supported by the $1.8 billion FY 2000 budget request of the USGCRP. This request includes a new Carbon Cycle Science Initiative and the U.S. climate modeling effort.

• The climate change issue requires two issues to be addressed: (1) a sustained and enhanced commitment to energy research, development, and deployment; and (2) continued research into the science of climate change.

Mr. Reicher testified on the DOE's FY 2000 climate change budget request of approximately $1.1 billion, and Mr. Gardiner discussed EPA's role in CCTI and its FY 2000 budget requests of $216 million for CCTI and $200 million for a Clean Air Partnership Fund.

Dr. Hakes gave testimony on the EIA report, Analysis of The Climate Change Technology Initiative, which was conducted at the request of Science Committee Chairman Sensenbrenner and Ranking Minority Member George Brown, Jr. The EIA analysis predicts that the CCTI tax incentives would only reduce projected U.S. carbon emissions in 2010 by 3.1 million metric tons, or 0.17 percent. The EIA also found that while research, development, and deployment programs also have benefits in reducing carbon emissions, it is not possible to link program expenditures directly to program results or to separate the impacts of incremental funding requested for FY 2000 from ongoing program expenditures. In addition, Dr. Hakes testified that the current EIA AEO99 estimates already include the impacts of ongoing research and development.

4.3(g)—Fiscal Year 2000 Budget Authorization Request: National Oceanic and Atmospheric Administration and NOAA Fleet Maintenance and Planning, Aircraft Services, and NOAA Corps

April 15, 1999

Hearing Volume No. 106–30

Background

On April 15, 1999 the Subcommittee on Energy and Environment held a hearing entitled, "Fiscal Year 2000 Budget Authorization Request: National Oceanic and Atmospheric Administration and NOAA Fleet Maintenance and Planning, Aircraft Services, and NOAA Corps" to hear testimony on the justification of NOAA's FY 2000 budget request. The hearing also reviewed the prospects of privatizing some aspects of the NOAA fleet in order to save money and ensure a more efficient use of the fleet.

Witnesses included: Mr. Bob J. Taylor, Acting Deputy Director, Office of NOAA Corps Operations; accompanied by Dr. Andrew A. Rosenberg, Deputy Assistant Administrator for Fisheries, National

Marine Fisheries Service (NMFS) and Dr. Michael P. Sissenwine, Science and Research Director, NOAA Fisheries Northeast Fisheries Science Center, Woods Hole, Massachusetts; Mr. George E. Ross, Assistant Inspector General for Auditing, U.S. Department of Commerce; Dr. Craig E. Dorman, Senior Scientist, Applied Research Laboratory, Pennsylvania State University and Special Assistant to the Executive Director and Technical Director, Office of Naval Research; and Dr. Robert A. Knox, Chair, University-National Laboratory Oceanographic System, and Research Oceanographer and Associate Director, Scripps Institution of Oceanography, University of California, San Diego.

Summary of hearing

Mr. Taylor's testimony addressed NOAA's FY 2000 budget request for Fleet Maintenance and Planning, Aircraft Services, NOAA Corps, and included the following:

- Many of NOAA's ships, while serviceable, are well over 30 years of age and must be replaced.
- In addition to the $51.6 million, NOAA hopes to spend a total of $184.6 million for four new replacement ships over the 5-year period ending in FY 2004—$51.6 million in 2000, $51.0 million in 2001, $39.8 million in 2002, $40.2 million in 2003, and $2.1 million in 2004.
- NOAA is requesting $350,000 for aircraft services to support a second flight crew on NOAA's Gulfstream-IV high altitude hurricane reconnaissance jet.
- NOAA Corps had been downsized from 400 officers in 1995 to about 240 officers presently and has made strides in increasing the amount of outsourcing.
- The Administration has changed its position on the need to downsize the Corps in response to Public Law 105–384.
- NOAA is currently beginning to work on a national plan for conducting marine fisheries research, which includes academic and private sector input.
- Any new ships built would simply be for replacement purposes, there will still be an increased need for chartering.

Mr. Ross discussed NOAA's need to expand private sector participation in order to more efficiently and cost-effectively utilize its resources. Mr. Ross also discussed the following findings and recommendations by the Inspector General's (IG) office:

- NOAA must identify and thoroughly assess alternative approaches to relying on its own vessels.
- NOAA could outsource many areas of fishery research to academia, the private sector, and other government ship operators. This would allow NOAA to change its focus from designing, owning, and operating ships to a more research-oriented direction.
- The aircraft services cost 42 percent more than similarly chartered aircraft from the private sector and, therefore, NOAA must privatize this operation. Factors contributing to this cost include: (1) NOAA's overhead structure; (2) low level of aircraft utilization; (3) rising operation costs due to the age of the aircraft; and (4) high training costs due to the periodic rotation of pilots.
- NOAA Corps needs to be downsized in order to achieve significant cost savings and management efficiencies. As such, the IG rec-

ommends no more than 70 officer positions should be allocated to ship- and aircraft-related activities.

Dr. Dorman presented reports he had submitted in 1998 to the NOAA Administrator, Dr. D. James Baker, and to the Office of Management and Budget that included many observations and recommendations concerning the fisheries research programs:

- A national plan must be devised in order to achieve maximum efficiency out of any new fisheries research vessel (FRV) that may be constructed.
- Two actions are required to justify the cost of any new vessel built, including: (1) the use of advanced acoustics technology; and (2) an attitude change by NOAA to consider the FRVs as a national asset and not a replacement vehicle solely dedicated to the National Marine Fisheries Service.
- Any such plan, and subsequent FRV, must be done in conjunction with other federal agencies, private interests, and academic communities.
- There is a need to reintegrate fisheries oceanography mandates operated as part of the national research fleet, preferably at the university level. NOAA Corps is not needed for this task.
- In a very few years, virtually all hydrographic survey in U.S. waters can be done by industries, and as such, Dr. Dorman recommends that NOAA's fleet of the future should number half a dozen ships or less.
- A new FRV should be expected to operate for over 300 days a year.

Dr. Knox testified on the status of UNOLS operations and their ability to work with NOAA on a wide range of projects:

- The UNOLS fleet is very modern and highly capable of taking on many of the tasks required by NOAA's National Marine Fisheries Service (NMFS) in addition to its academic research support function.
- A closer cooperation between UNOLS and NMFS would benefit both the academic community and the taxpayers by ensuring efficient use of resources for research projects and decreasing risk of using federal funds for repairs and replacements that are not warranted.
- There is a need for a long-range ship renewal plan that treats UNOLS, NOAA, and other U.S. research vessel fleets comprehensively.

4.3(h)—S. 330 and H.R. 1753: Methane Hydrate Research and Development Act of 1999

May 12, 1999

Hearing Volume No. 106–14

Background

On May 12, 1999 the Subcommittee on Energy and Environment held a hearing entitled, "S. 330 and H.R. 1753: Methane Hydrate Research and Development Act of 1999."

Witnesses included: Mr. Robert S. Kripowicz, DOE Principal Deputy Assistant Secretary for Fossil Energy; Dr. William P. Dillon, Research Geologist, Geologic Division, U.S. Department of In-

terior, U.S. Geological Survey (USGS); and Dr. Gerald D. Holder, USX Dean of Engineering, University of Pittsburgh.

Summary of hearing

Mr. Kripowicz presented DOE's views on the potential for methane hydrates as a future source of natural gas, to review the progress the Department is making in preparing a multi-agency coordinated research plan for this potentially vast energy resource, and DOE's position on S. 330, the Methane Hydrate Research and Development Act, as follows:

- Worldwide, estimates of the natural gas potential of methane hydrates approach 400 million trillion cubic feet—a staggering figure compared to the 5,000 trillion cubic feet that make up the world's currently known gas reserves.
- From 1982–1992, DOE's methane hydrate program spent $8 million in developing a foundation of basic knowledge about the location and thermodynamic properties of gas hydrates.
- In FY 1997 and FY 1998, DOE provided a small amount of funding from its Natural Gas Supply Program to support activities in preparation for a more definitive program proposed for FY 1999.
- In its 1997 report, the Energy Research and Development Panel of the President's Committee of Advisors on Science and Technology (PCAST) recommended "a major initiative for DOE to work with USGS, the Naval Research Lab, Mineral Management Service, and the industry to evaluate the production potential of methane hydrates in U.S. coastal waters and world wide." PCAST also called attention to the possibility that studies of methane hydrates could lead to possible sequestering of carbon dioxide (CO_2) in CO_2 hydrates.
- On January 21–22, 1998, DOE hosted a workshop in Denver on the "Future of Methane Hydrate Research and Resource Development," and held a second workshop in Washington, DC, on May 12, 1998, to review a "strawman" Methane Hydrates Program Plan. From these workshops and other planning, activities carried out cooperatively with the USGS, the Naval Research Laboratory, the NSF, the Minerals Management Service and industrial and academic experts, DOE published a "Strategy for Methane Hydrates Research & Development" in August 1998, which outlines a multidisciplinary 10-year national program that will begin in FY 2000 with the aim of producing the knowledge and products necessary for the private sector to begin commercially-viable production of methane from hydrates by 2015.
- Because future program activities were still in the formative stage, DOE requested only a minimal level of R&D funding ($500,000) in its FY 1999 budget submission to Congress. In FY 2000, the Department has requested an increase in funding to $2.0 million to initiate the multidisciplinary program strategy.
- S. 330 would promote the research, identification, assessment, exploration, and development of methane hydrate resources. The legislation is consistent with the goals DOE has established for the Federal hydrates R&D program; therefore, the Department can support this measure.

Dr. Dillon discussed the USGS assessment of natural gas hydrate resources and examined the technology that would be necessary to safely and economically produce gas hydrates, as follows:

• The primary objectives of USGS gas hydrate research are to: (1) document the geologic parameters that control the occurrence and stability of gas hydrates; (2) assess the volume of natural gas stored within gas hydrate accumulations; (3) identify and predict natural sediment destabilization caused by gas hydrate; and (4) analyze the effects of gas hydrate on drilling safety. The USGS in 1995 made the first systematic assessment of the in-place natural gas hydrate resources of the United States, which showed that the amount of gas in the hydrate accumulations of the United States greatly exceeds the volume of known conventional domestic gas resources. However, gas hydrates represent both a scientific and technologic frontier, and much remains to be learned about their characteristics and possible economic recovery.

• The amount of methane contained in the world's gas hydrate accumulations is enormous, but estimates of the amounts are speculative and range over three orders-of-magnitude from about 100,000 to 270,000,000 trillion cubic feet of gas. Despite the enormous range of these estimates, gas hydrates seem to be a much greater resource of natural gas than conventional accumulations.

• Even though gas hydrates are known to occur in numerous marine and Arctic settings, little is known about the geologic controls on their distribution. Gas hydrates have been recovered by scientific drilling along the Atlantic, Gulf of Mexico, and Pacific coasts of the United States, as well as at many international locations.

• To date, onshore gas hydrates have been found in Arctic regions of permafrost and in deep lakes such as Lake Baikal in Russia. Gas hydrates associated with permafrost have been documented on the North Slope of Alaska and Canada and in northern Russia. Combined information from Arctic gas-hydrate studies shows that, in permafrost regions, gas hydrates may exist at subsurface depths ranging from about 130 to 2,000 meters.

• The USGS 1995 National Assessment of United States Oil and Gas Resources focused on assessing the undiscovered conventional and unconventional resources of crude oil and natural gas in the United States, and included for the first time a systematic appraisal of the in-place natural gas hydrate resources of the United States, both onshore and offshore. The mean (expected value) in-place gas hydrate resource for the entire United States is estimated to be 320,000 trillion cubic feet of gas. However, this assessment does not address the problem of gas hydrate recoverability.

• Gas recovery from hydrates is hindered because the gas is in a solid form and because hydrates are usually widely dispersed in hostile Arctic and deep marine environments.

• Seafloor stability and safety are two important issues related to gas hydrates. Seafloor stability refers to the susceptibility of the seafloor to collapse and slide as the result of gas hydrate disassociation. The safety issue refers to petroleum drilling and production hazards that may occur in association with gas hydrates in both offshore and onshore environments.

Dr. Holder testified in support of the legislation, and made the following observations:

- S. 330 will not only provide an opportunity for outstanding scientific inquiry into the very frontiers of geophysics, oceanography and chemical engineering, but will also have important consequences for the future of the world's energy supply and for the potential impact of fossil fuels on global climate change.
- The amount of gas in gas hydrate form is sufficient to replace all other forms of fossil fuel. The USGS estimates that hydrates contain 320,000 trillion cubic feet of gas, which currently sells for about $2.30 per 1000 cubic feet, wholesale, so that the market value of this gas is about $700 trillion dollars. From another point of view, the amount of energy in hydrate gas is more than twice that in all other forms of fossil fuel combined.
- Methane from hydrates (or other sources) produces much less carbon dioxide per unit energy than other forms of fossil fuel. Wide production of methane from hydrates could reduce carbon dioxide emissions by as much as 20% on a global basis without any reduction in energy consumption. No other technology can compete with methane hydrate fuel in its potential short-term impact on carbon dioxide emissions.
- S. 330 will allow two important areas to be addressed: (1) developing maps of the locations and nature of the hydrate resource; and (2) technology for gas recovery. In addition to these important developments, S. 330 will make important contributions to our scientific knowledge of gas hydrates, their physical properties, and the molecular mechanisms by which hydrates grow and decompose.

4.3(i)—Tornadoes: Understanding, Modeling, and Forecasting Supercell Storms

June 16, 1999

Hearing Volume Number 106–11

Background

On June 16, 1999, the Subcommittees on Energy and Environment and Basic Research held a joint hearing examining federally-funded tornado research and how that research is used by the National Weather Service (NWS) to improve warning times.

NOAA and the National Science Foundation (NSF) also support jointly the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. (For FY 1999, NSF provided $66 million to NCAR for atmospheric research.) NSF also supports university-based research in tornadoes. One of the original NSF Science & Technologies Centers is the Center for Analysis and Prediction of Storms (CAPS) at the University of Oklahoma, which over the years has received $15 million in funding.

NWS has set a goal of increasing the average lead time for tornadoes from the current 11 minutes to about 13 minutes by 2001. In addition, it has set a target of 70 percent accuracy. NWS hopes to achieve these goals through application of new technology (e.g., NEXRAD and AWIPS), new satellites, improved weather forecasting models, observing systems, and research.

Witnesses appearing before the Subcommittees included: Mr. Dennis McCarthy, Meteorologist in Charge, Norman Weather Forecast Office; Dr. Morris Weisman, Mesoscale and Microscale Meteorology Division, National Center for Atmospheric Research; Dr. Roger M. Wakimoto, Professor and Chair, Department of Atmospheric Science, University of California Los Angeles; and Dr. Howard Bluestein, Professor of Meteorology, University of Oklahoma.

Summary of hearing

Mr. Dennis McCarthy opened his testimony by noting the May 3, 1999 tornado outbreak that killed 42 people and injured 795 in Oklahoma. He stated that the outbreak, while tragic, demonstrated how much progress has been made in issuing accurate and timely weather warnings. He testified that on that day, outlooks, watches and warnings were issued well in advance and they were communicated rapidly. He said the media, emergency managers, local officials, volunteer spotter groups and state agencies worked in partnership to keep people informed. He pointed to technological developments such as NEXRAD Doppler radar and the Advanced Weather Interactive Processing System (AWIPS) that have assisted the National Weather Service in improving its warning capabilities. He concluded by emphasizing the importance of continued tornadic storm research in improving the accuracy and timeliness of severe weather warnings.

Dr. Morris Weisman opened his testimony by emphasizing how, over the past two decades, much progress has been made in understanding and forecasting tornado outbreaks of the kind that devastated Oklahoma and Kansas on May 3, 1999. He stated that this progress has come about through a strong connection between the research and forecast communities. Dr. Weisman used radar images of the May 3rd tornadoes, along with training materials developed for the National Weather Service, to illustrate the local conditions that form such storms, detailed the physical aspects of the storms, and reviewed new forecasting theories and applications. He also presented results from experimental forecast models which were run on May 3rd that offer hope such events could some day be forecast hours in advance, rather than 10–30 minute warning currently available.

Dr. Roger Wakimoto noted the science of forecasting the atmospheric conditions that will lead to the development of a supercell storm is rather effective; whereas, the science surrounding the development of a tornado within a supercell is not nearly so well-understood. He testified that some important questions remain unanswered: what triggers the genesis of a tornado in a supercell? What is the origin of rotation within supercell tornadoes? He also stated that more research is necessary in understanding tornadoes that form in non-supercell storms, such as those that form in so-called "bow" echo storms.

Dr. Howard Bluestein testified on federally-funded research aimed at understanding the formation and behavior of tornadoes. He highlighted the success of new radar technologies including the NEXRAD and mobile Doppler systems, noting that these technologies give researchers a much higher-resolution look at the structure of tornadoes. He stated that with new radar technology,

and faster and larger computers, researchers can make great progress in the next five to ten years in determining how and why tornadoes form, and in developing the best ways to protect the citizenry.

4.3(j)—EPA's High Production Volume (HPV) Chemical Testing Program

June 17, 1999

Hearing Volume No. 106–18

Background

On June 17, 1999, the Subcommittee on Energy and Environment held a hearing entitled, "EPA's High Production Volume (HPV) Chemical Testing Program." This hearing examined the HPV testing program which will test toxicity of chemicals produced in quantities exceeding 1 million pounds per year using, in many cases, the LD–50 (lethal dose in 50% of test animals) animal test protocol. The purpose of the hearing was to clarify the program's aims, the status of changes that have been made since the program was announced, and EPA's future plans for this, and other related testing programs.

Witnesses included: Dr. William Sanders, Director of the EPA's Office of Pollution Prevention and Toxics; Dr. Neal Barnard, President of the Physician's Committee for Responsible Medicine; and Jessica Sandler, an Industrial Hygienist Consultant with the Doris Day Animal League and People for the Ethical Treatment of Animals (PETA).

Summary of hearing

Dr. Sanders testified on the origins, implementation and current status of the EPA's HPV Challenge, a voluntary chemical-testing program, and of the mandatory test rule, due in December 1999. He discussed EPA's efforts to eliminate duplicative testing, reduce the use of animal testing, and the search for alternative test methods within the HPV program. He defended the implementation of the program and the voluntary nature of the HPV challenge. He indicated that a draft of the test rule would be available sometime in July or August 1999.

Dr. Barnard testified the program is flawed—there is a great deal of duplication in the testing and adequate testing is available for many of the chemicals included on the test schedule. He indicated many of the items on the list have years of in-use data and therefore do not need to be tested. He said many of the chemicals are in fact food additives that have significant bodies of test data already from other federal agencies such as the FDA.

Ms. Sandler spoke of the unnecessary nature of much of the LD–50 testing mandated by the program since much of the data already exists, or is duplicative. She said testing of low-toxicity chemicals is extremely cruel to animals because they are more likely to die from stomach or esophageal rupture than from toxic effects. She also objected to the lack of openness in the design of the HPV challenge program; the parties to the agreement did not invite all interested parties to comment on the program before it was

announced. She noted many alternatives exist to the animal testing under both the voluntary and proposed mandatory test program, and said EPA has impeded the progress toward acceptance of these alternatives in international fora.

4.3(k)—Restructuring the Department of Energy

July 13, 1999

Hearing Volume 106–33

Background

On July 13, 1999, the Subcommittee on Energy and Environment held a hearing entitled, "Restructuring the Department of Energy." This hearing focused on the problems in the existing DOE organization, current proposals to restructure the national security functions in response to the security lapses identified in the Cox and Rudman Reports, the effect of such proposals on non-defense research, and on environment, safety, and health protection.

Witnesses included: Mr. Victor S. Rezendes, Director, Energy, Resources, and Science Issues, GAO; Major General George McFadden (U.S. Army, Retired) former Director of the DOE Office of Security Affair; Dr. William Happer, Professor of Physics, Princeton University and former Director of the DOE Office of Research; Dr. Donald Kettl, Professor of Public Affairs and Political Affairs, Mr. Robert M. LaFollette Institute of Public Affairs, University of Wisconsin-Madison; and Ms. Maureen Eldredge, Alliance for Nuclear Accountability.

Summary of hearing

Mr. Rezendes testified on DOE's accountability, organizational structure, and reorganization options:

- Achieving accountability in DOE is made difficult by its complex and ever-changing organizational structure. Past advisory groups and internal DOE studies have often reported on the Department's dysfunctional structure—with unclear chains-of-command among headquarters, field offices, and contractors.
- To solve recent national security problems, several organizational reorganization options have been proposed. Historically, DOE has made piecemeal changes in response to contemporary problems without undertaking a more fundamental assessment of its mission. None of these efforts have had long-term success.
- A majority of the experts consulted by GAO in 1994 emphasized that DOE should focus on its core missions and favored moving many of the remaining missions from DOE to other entities.

Major General McFadden testified on security operations within DOE, and specifically the history of organizational placement of security offices:

- Secretary Richardson has established the Office of Security and Emergency Operations that reports directly to him.
- Intelligence and counter-intelligence are important to security and should be included and coordinated in the same organization.

Dr. Happer testified on current proposals to restructure DOE and noted the following:

• The DOE has many missions, but none more important than nuclear stewardship: ensuring the safety, security, and reliability of the U.S. nuclear stockpile.

• DOE's missions—including the nuclear weapons mission—are often poorly managed. The DOE weapons program is so challenging that it needs the most capable technical, scientific, and managerial talents available.

• The DOE has become a bureaucratic morass, with many paper-pushing, regulatory offices competing to take credit for successes of increasingly harried, front-line scientists, engineers, and technicians, and to avoid responsibility for anything that may go wrong.

• The proposed Agency for Nuclear Stewardship will need to control all of the key functions, among them manufacturing, security, research, and safety.

Dr. Kettl testified on the DOE's organizational structure as it affects national security and discussed the following:

• DOE's problems clearly result in part from a dysfunctional organizational structure that is the legacy of previous reorganizations, from the Manhattan Project to the present. The Department would benefit from an organizational housecleaning. Any restructuring should meet six criteria: (1) enhance DOE's capacity to perform its mission; (2) improve coordination within DOE; (3) create clear lines of accountability; (4) promote national security; (5) redefine DOE's culture; and (6) create a high-performing organization.

• The core DOE problem is changing the culture of field operations. If we seek to solve problems simply by restructuring headquarters, we will fail to solve the problem and will only encourage the dysfunctional culture to continue.

• A single-minded focus on national security could weaken the Department's environmental, safety, and health protection missions.

Ms. Eldredge testified that one of the major problems at DOE is an entrenched bureaucracy with little incentive to change, and the ability to wait out any major reform efforts. She believed that the reform proposal to establish a semi-autonomous agency is not an appropriate approach to addressing DOE's problems. She recommended that the Office of Environment, Safety, and Health be made a separate, independent office that has enforcement over all other parts of DOE.

4.3(l)—Reducing Sulfur in Gasoline and Diesel Fuel

July 21, 1999

Hearing Volume No. 106–28

Background

On July 21, 1999, the Subcommittee held a hearing entitled, "Reducing Sulfur in Gasoline and Diesel Fuel." This hearing examined EPA's proposed rule to reduce sulfur in gasoline and its separate rule to reduce sulfur in diesel fuel. The Subcommittee heard testimony on the benefits to be derived from the reduction of sulfur in fuels; the issue of reversibility of catalytic converter "poisoning" by sulfur in gasoline; the potential problems from a regional approach to sulfur regulations; the possible effects on small and regional re-

fineries from costs of installing new technologies; and the potential for supply disruptions under the rule.

Witnesses included: Ms. Margo T. Oge, Director, EPA Office of Mobile Sources of the Office of Air and Radiation; Dr. Loren K. Beard, Alliance of Automobile Manufacturers & Senior Manager, Material Engineering, Fuels, Daimler Chrysler; Mr. Jerry Thompson, National Petrochemical & Refiners Association & Sr. Vice President Technical Development, CITGO Petroleum; Mr. S. William Becker, Executive Director, State & Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials; and Mr. Clint W. Ensign, Vice President Government Relations, Sinclair Oil Corporation.

Summary of hearing

Ms. Oge testified on the benefits to be derived from reductions of gasoline and diesel sulfur. She indicated that the EPA had worked with both the auto and petroleum industries and had arrived at sulfur reductions that are in line with those in place in California. She said that these reductions in sulfur will bring about large reductions in several criteria air pollutants, including NO_X and particulate matter, and that they will also enable the auto manufacturers to move toward new, highly efficient and low emission technologies. The EPA, she said, is satisfied with the auto industry's assertion that reversibility is sufficiently low on next generation catalysts to justify their national rule over a regional standard.

Dr. Beard testified that reductions of sulfur will allow the auto industry to introduce lean-burn, direct-injection engines and advanced catalysts which will both increase fuel economy and reduce emissions sufficiently to meet Tier II standards. He said that the auto industry seeks a further reduction from 30 parts per million (PPM) of sulfur under the rule to 5 PPM to avoid catalyst "poisoning." He stated that reversibility is low in current catalysts, and would be much lower in next generation emissions control systems. He argued vigorously for a national standard based on the mobility of automobiles and on low reversibility.

Mr. Thompson testified that the proposed EPA rule is unnecessary and a regional rule with phased sulfur reduction would suffice. He stated reversibility is higher than either the EPA or the auto manufacturers stated. He also tied the tough gasoline specifications in California to the decline in active refineries in the state and to recent price spikes, which sent the price of a gallon of gasoline to over $2 in California. He appealed to the Committee to ask EPA to delay the rule or allow greater flexibility than the barter and trade proposal that EPA has forwarded as part of the rule.

Mr. Becker testified that his associations had passed a resolution that was in-line with the EPA's national standard, and said that this approach will allow the states to achieve goals mandated under State Implementation Plans (SIPs). Without the sulfur reductions, he said, achieving and maintaining goals will be close to impossible in most parts of the country. He also stated that since they believe that reversibility is low, a national rule is required.

Mr. Ensign spoke of the plight of small and independent refiners, both in California and in the rest of the country. He indicated that

his company would have to close one of three regional refineries that they currently operate if EPA imposes the proposed rule as it stands. He claimed that refiners, particularly the smaller, independent refiners, will have a difficult time raising capital and implementing technology upgrades under the 2004 deadline. He asked that the EPA provide greater flexibility for refineries or the rest of the country could be faced with the same problems that occurred in California; closing refineries and greater market volatility.

4.3(m)—External Regulation of DOE Facilities: Pilot Project Results

July 22, 1999

Hearing Volume 106–29

Background

On July 22, 1999, the Subcommittee on Energy and Environment held a hearing entitled, "External Regulations of DOE Facilities: Pilot Project Results." This hearing examined the results of external regulation Pilot Projects at Lawrence Berkeley National Laboratory (LBNL), the Receiving Basin for Offsite Fuel at Savannah River, the Radiochemical Engineering Development Center (REDC) at Oak Ridge National Laboratory (ORNL), and at the East Tennessee Technology Park that have been jointly conducted by DOE, the Nuclear Regulatory Commission (NRC), and the Occupational Safety and Health Administration (OSHA).

Witnesses included: The Honorable David M. Michaels, DOE Assistant Secretary for Environment, Safety, and Health; The Honorable Greta Joy Dicus, NRC Chairman; Mr. Jerold R. Mande, Deputy Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor; and Ms. Gary L. Jones, Associate Director of Energy, Natural Resources, and Science Issues, GAO.

Summary of hearing

Dr. Michaels testified on the results of pilot projects conducted by DOE with OSHA and the NRC and noted the following:

- The goal of the pilots with the NRC was to get a factual assessment of the costs and benefits of external regulation that was based on actual experience at DOE sites. DOE and NRC pilots were conducted at three sites: Lawrence Berkeley National Laboratory (LBNL), the Receiving Basin for Offsite Fuel (RBOF) at Savannah River, and the Radiochemical Engineering Development Center (REDC) at Oak Ridge National Laboratory.
- NRC requirements were designed largely for the commercial nuclear sector. DOE's facilities are diverse, unique, and often aging.
- The OSHA pilots were designed to assess implementation and feasibility issues, not costs and benefits of external regulation. DOE and OSHA pilots were conducted at ORNL and the East Tennessee Technology Park. DOE and OSHA previously conducted a pilot at Argonne National Laboratory in 1996. OSHA participated in the LBNL pilot as well. OSHA indicated that an enhanced oversight program would be required, based on the uniqueness of DOE facilities.

• DOE is working on a memorandum of understanding that will have OSHA assume jurisdiction overall at facilities that DOE leases to private enterprise.

• Each of the pilots demonstrated that safety at DOE facilities is sound, much better than average industrial facilities.

Ms. Dicus testified on the results of the external regulation pilot projects conducted jointly by DOE and the NRC and discussed the following:

• Though the pilot sites selected were not representative of the entire DOE nuclear complex and did not include any defense facilities, the NRC found no significant issues during the pilot project that would impede NRC regulation of similar DOE non-defense nuclear facilities.

• The majority of the technical, policy, and regulatory issues identified during the pilot program can be adequately resolved within the existing NRC regulatory framework.

• The NRC is fully capable of regulating DOE facilities to the benefit of the American public, if Congress were to assign the NRC this mission and provide requisite fiscal and staffing requirements and legislation.

Mr. Mande testified on the issue of external regulation of worker safety and health for private-sector employees at national research laboratories and other worksites owned by DOE. He noted the following:

• OSHA is concerned that under external regulation, contractors could use site-specific training issues and the need for security clearances to hinder OSHA access to the site. DOE's active involvement in assisting OSHA with these matters would be essential to ensure this does not occur under external regulation.

• At Oak Ridge and Berkeley, OSHA utilized simulated inspections to study potential impacts of external regulation. These simulated inspections included opening and closing conferences with employers and employees, physical walk-throughs of sites to identify hazards, and the preparation of simulated citations and proposed penalties.

• OSHA's regulation of occupational safety and health at DOE sites should be authorized only if such action would lead to better protection for workers.

Ms. Jones testified on the status of DOE's progress toward the external regulation of nuclear and worker safety at its facilities and discussed three points: (1) DOE's changing positions on the desirability of external regulation for its facilities, (2) the disagreement between DOE and NRC on the potential costs and value added of external regulation, and (3) the uncertainties for the future of external regulation in DOE. She noted that each of the last three DOE Secretaries has changed the Department's position on external regulation, but that the current Secretary believes it is no longer a worthwhile pursuit because the costs would likely outweigh the value of external regulation. She said that the current Secretary's position sharply contrasts with DOE's previously held positions supporting external regulation and also conflicts with the Department's own pilot program results as well as the conclusions reached by NRC and OSHA. The results of the pilot program and the extensive practical experience gained with NRC and OSHA, she

said, show that external regulation improves safety and accountability and is not likely to be prohibitively expensive.

4.3(n)—Reformulated Gasoline—Part I

September 14, 1999

Hearing Volume No. 106–48

Background

On September 14, 1999, the Subcommittee on Energy and Environment held part one of a hearing entitled, "Reformulated Gasoline (RFG)—Part I." This hearing examined clean air benefits from RFG as well as concerns that have surfaced about methyl tertiary butyl ether (MTBE) and the contamination of both surface and underground drinking water supplies. A recent National Research Council (NRC) study found that the use of reformulated gas is less effective in reducing ozone and smog than previously thought. The EPA's own Blue Ribbon Panel on Oxygenates in Gasoline recommended that the mandate for MTBE be lifted and that localities be allowed to choose how much, if any, MTBE or ethanol be used in gasoline.

Most RFG is gasoline blended with oxygenates[2]. These oxygenates, including MTBE, ethanol and MMT, are used to reduce emissions of air pollutants from mobile sources (i.e., vehicles). Recently, California and Maine have decided to ban MTBE in RFG. California is currently studying alternatives that will allow them to achieve clean air goals without MTBE.

Critics of the RFG program contend that reformulated fuel reduces engine performance and gas mileage. They also point to evidence that MTBE has been released into groundwater supplies from underground storage tanks and is evident in surface waters from two-stroke engines and spills. Proponents argue that RFG has helped achieve many of the clean air goals required under the Clean Air Act. Removing oxygenates from gasoline will have a negative affect on air quality.

The Subcommittee hoped to determine whether the oxygenate mandate is based on sound science. In particular, MTBE contamination of drinking water reported by the EPA's Blue Ribbon Panel combined with the less-than-expected clean air benefits of oxygenates reported in the NRC study have called into question the science behind the oxygenate mandate.

Witnesses included: Ms. Margo T. Oge, Director of the EPA Office of Mobile Sources of the Office of Air and Radiation; Dr. William L. Chameides, Chairman of the National Research Council Panel on Ozone Forming Potential of Reformulated Gasoline and Regents Professor, School of Earth and Atmospheric Sciences, Georgia Institute of Technology; Mr. Daniel S. Greenbaum, Chairman, EPA Blue Ribbon Panel on Oxygenates in Gasoline and President, Health Effects Institute; Mr. Thomas V. Skinner, Director of the Illinois EPA; and Mr. Mark D. Beuhler, Affiliated Water Districts of California and Water Quality Manager, Metropolitan

[2] Several manufacturers, including Chevron, produce reformulated gasoline without using oxygenates.

Water District of Southern California on behalf of the Association of California Water Agencies.

Summary of hearing

Ms. Oge testified:

• The benefits that have been derived from the Federal RFG program while acknowledging the problems associated with MTBE in drinking water supplies.

• EPA has made no decision about granting waivers from the oxygenate mandate in the RFG program under the Clean Air Act Amendments (CAAA) of 1990.

• Ethanol will have to be examined as an alternative for MTBE to help maintain clean air standards.

• Under the CAAA of 1990 EPA has not expressed any preference between MTBE and ethanol—they have only required that they achieve emissions standards mandated under the CAAA.

• Much of the problem with MTBE can be addressed through upgrading underground storage tanks.

Dr. Chameides testified:

• Clean air benefits derived from oxygenates may be overstated, especially when reactivity of emissions is measured rather than mass of emissions.

• Many of the clean air benefits attributed to RFG might in fact be related to improved emissions control and fleet turnover.

Mr. Greenbaum testified:

• The EPA's Blue Ribbon Panel concluded that MTBE had been detected in an increasing number of drinking water supplies.

• The Panel concluded that the oxygenate mandate should be lifted as long as there is no "backsliding" on air quality.

• There are significant sources of MTBE contamination other than leaking underground storage tanks and that these sources may be more difficult to contain.

Mr. Skinner testified on the success of the ethanol RFG program in the Chicago non-attainment area. He stated he would not be advocating the increased use of ethanol if it did not produce significant clean-air benefits. He also requested EPA relax rules regarding the summertime use of ethanol, and noted the Wisconsin RFG program had not reported any problems since the switch from MTBE to ethanol.

Mr. Buehler testified on the difficulties created in his water district and throughout California from the use of MTBE. He also discussed the costs and technical impediments to removing MTBE from drinking water supplies. He also addressed customer concerns related to odor and taste as well as potential health effects from MTBE in drinking water.

4.3(o)—Reformulated Gasoline (RFG)—Part II

September 30, 1999

Hearing Volume No. 106–48

Background

On September 30, 1999, the Subcommittee held Part II of a two-part hearing entitled, "Reformulated Gasoline (RFG), Part II." This

hearing, which examined clean air benefits from RFG as well as concerns that have surfaced about MTBE and the contamination of both surface and underground drinking water supplies, allowed stakeholders to comment on testimony heard in the September 14, 1999, hearing on RFG.

Witnesses included: Dr. Edward Murphy, Director Downstream, American Petroleum Institute (API); Dr, Alfred J. Jessel, Principal Consultant, Fuels Regulation and Emissions Technology, Chevron Products Company; Mr. Jason S. Grumet, Executive Director, Northeast States for Coordinated Air Use Management (NESCAUM); Mr. Nicholas L. Economides, Director of Technical Programs, Oxygenated Fuels Association; and Mr. W.H. Eric Vaughn, President and Chief Executive Officer, Renewable Fuels Association.

Summary of hearing

Dr. Murphy testified on the state of the RFG program nationwide and the difficulty of creating a *de facto* ethanol mandate by maintaining the oxygenate requirement and banning MTBE in certain markets. He expressed confidence that API members can meet stringent air quality requirements without an oxygenate mandate and that the mandate could be lifted without "backsliding" on air quality.

Dr. Jessel testified on Chevron's ability to supply large quantities of non-oxygenated RFG to the California market. He spoke of the inflexibility in the current law and the effects such regulatory inflexibility has on supply and pricing. He indicated that while their clean-burning gasoline meets all EPA emissions requirements, Chevron is unable to sell this fuel in Southern California because it doesn't contain the EPA oxygenate minimum. He also indicated that Chevron conducted an internal risk analysis of MTBE and found that there was no way of guaranteeing against MTBE contamination of groundwater.

Mr. Grumet testified on the difficulties caused by MTBE, but cautioned against phasing it, and other oxygenates, out too rapidly. He noted that MTBE replaces other carcinogens and toxic gasoline components, which will be added back to gasoline formulations in the Northeast, if MTBE is banned. He stated his belief that the states should be given broad latitude to establish their own programs to address clean air and clean water issues.

Mr. Economides testified that MTBE has played a large part in the emissions reductions that have been observed across the country. He indicated that ethanol is not a good replacement for MTBE because of supply problems and higher volatility. He stated that the health risks posed by MTBE are not significant at the levels detected in water supplies around the country and that even these risks could be addressed by upgraded storage tanks. He also noted that MTBE is used to make up temporary shortfalls in gasoline supply and that the California ban will cause supply disruptions and price increases.

Mr. Vaughn advocated the increased use of ethanol. He dismissed concerns that ethanol could not be manufactured in sufficient quantities to supply the entire country. He also sought flexibility in the EPA's summer RFG program, which currently limits

the use of ethanol in summer due to its higher volatility. The Renewable Fuels Association believes that the oxygenate mandate should be kept in place while MTBE is phased out in California, which will create a *de facto* monopoly for ethanol.

4.3(p)—Fuels for the Future

October 5, 1999

Hearing Volume No. 106–59

Background

On October 5, 1999, the Subcommittee on Energy and Environment held a hearing entitled, "Fuels for the Future." This hearing examined potential new sources of transportation fuels, especially as supplies of traditional hydrocarbon fuels such as diesel and gasoline begin to decline in the next century.

The range of fuels that will be required in the future is dependent upon future automotive developments. The likely range of options includes improved gasoline/diesel engines; electric/gasoline hybrids; electric cars; and hydrogen fuel cell powered cars. Each of these alternative technologies may require new fuels or modifications of existing fuels as well as potential new fuel distribution systems.

As the supply of readily recoverable petroleum begins to decline, the world will need to find new sources of energy to fuel our mobile lifestyles. These fuels will require improvements in existing designs, or entirely new technologies before they come into widespread use. It will be important to know how changing demographics and demand in the marketplace will be addressed by technology and by new fuel supplies and vice-versa.

Witnesses included: The Honorable Jay E. Hakes, Administrator, EIA, DOE; Dr. John W. Holmes, Energy Manager, Corporate Planning, Exxon, representing the American Petroleum Institute; and Dr. James A. Spearot, Director of the Chemical and Environmental Sciences Laboratory at General Motors, representing United States Council for Automotive Research (USCAR).

Summary of hearing

Dr. Hakes testified on the EIA's projections for the energy market for the next 20 years, which call for a stable petroleum supply. He cited new technologies that are being used to extract petroleum previously thought to be inaccessible, and said that these will enable petroleum supply to increase to the expected 110 million barrels a day that will be needed by 2020. He also spoke of conversion of natural gas to methanol or diesel and cellulosic biomass as potential new sources of energy.

Dr. Holmes testified regarding API programs to develop fuels for fuel cells. He discussed the pros and cons of each fuel choice and how fuel choice and technologies drive each other. He also spoke of the need for each emerging technology to compete on both performance and price. He called for any economic analysis to be done on a "well to wheels basis," meaning that all energy costs be factored into the production of alternative fuels, such as ethanol. Finally, he spoke of the infrastructure questions revolving around

the choice of fuels in the future, and noted that gasoline has a well-developed infrastructure that might be adaptable to other fuels such as methanol.

Dr. Spearot testified on the research efforts at the USCAR, a consortium of automobile manufacturers. He said that improvements in engine design would increase efficiency and reduce emissions, but that these improvements will require improved fuels, which include reductions in sulfur and other catalyst "poisons." While petroleum will likely be the preeminent source of transportation fuels for the near future, he suggested there should be a serious examination of other sources, including natural gas, biomass and solar energy. The fuel that is "chosen," he said, will need to have a high energy density, good combustion characteristics and a low tendency to form deposits. He also said that the ideal fuel for fuels cells would have a high hydrogen-to-carbon ratio and zero sulfur content.

4.3(q)—Is CO_2 a Pollutant and Does EPA Have the Power to Regulate It?

October 6, 1999

Hearing Volume 106–66

Background

On October 6, 1999, the Science Subcommittee on Energy and Environment and the Government Reform Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs held a joint hearing entitled, "Is CO_2 a Pollutant and Does EPA Have the Power to Regulate It?"

Four issues were addressed at the hearing: (1) Does the plain language, structure, and legislative history of the Clean Air Act (CAA) support or contradict EPA's claim to possess legal authority to regulate carbon dioxide (CO_2) as a pollutant? (2) If EPA were to regulate CO_2 emissions, what new costs and burdens might be imposed on U.S. businesses, farms, and households? (3) Do man-made emissions of CO_2 endanger public health, welfare, or the environment, or are such emissions enhancing global food security and biodiversity? (4) Is the term "pollutant" a scientific term?

Panel I witnesses included: The Honorable Gary S. Guzy, EPA General Counsel; Mr. Peter S. Glaser, Attorney at Law, Shook, Hardy, & Bacon, L.L.P.; Mr. James Huffman, Dean and Professor of Law, Lewis and Clark College Law School; and Mr. Jeffrey G. Miller, Professor of Law, Pace University Law School.

Panel II witnesses included: Dr. Patrick J. Michaels, Senior Fellow in Environmental Studies, CATO Institute, and Research Professor of Environmental Sciences, University of Virginia; Dr. Christopher B. Field, Carnegie Institute of Washington and Department of Plant Biology, Stanford University; and Dr. Keith E. Idso, Vice President, Center for the Study of Carbon Dioxide and Global Change.

Summary of hearing

Mr. Guzy testified on EPA's views as to the legal authority provided by the Clean Air Act to regulate emissions of CO_2, and stated the following:

- The Clean Air Act (CAA) includes a definition of the term "air pollutant," which is the touchstone of EPA's regulatory authority over emissions. Section 302(g) of the CAA defines "air pollutant" as "any air pollution agent or combination of such agents, including any physical, chemical, biological, [or] radioactive . . . substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant, to the extent that the Administrator has identified such precursor or precursors for the particular purpose for which the term 'air pollutant' is used."
- CO_2, as an air pollutant, is within EPA's scope of authority to regulate, but the Administrator has not yet determined that CO_2 meets the criteria for regulation under one or more provisions of the CAA.

Mr. Glaser testified on the EPA's authority to regulate CO_2 under the CAA or other statute and discussed the following:

- After analyzing rules of statutory construction established by the Supreme Court for discerning the scope of agency authority under Congressional enactments, the language of the relevant statutory text in context of the overall purpose of the statute, legislative history, and related Congressional activity, Congress did not delegate authority to EPA to regulate carbon dioxide emissions.
- Congress did not give EPA the power to regulate CO_2 emissions in the CAA or other enactment. Congress reserved the power to itself to determine in the future whether or not to authorize restrictions on CO_2 emissions.
- The text and structure of the CAA reveals Congress' deliberate choice to confine EPA's CAA endeavors on carbon dioxide to nonregulatory activities.

Mr. Miller testified that traditional methods of statutory interpretation support EPA's position. He said that the statute is unambiguous and the legislative history should not be a factor.

Mr. Huffman testified on the EPA's authority to regulate CO_2 emissions in terms of constitutional law. He noted that there are important and fundamental reasons that EPA does not have the authority to regulate CO_2. He said that EPA seeks to appropriate for itself a decision that our constitutional democracy requires Congress to make.

In Panel II, Mr. Michaels testified on the nature of carbon dioxide as a pollutant with regard to global climate change. He discussed climate change computer models and how those models led to conclusions that inaccurately reflect realities in atmospheric warming. He noted that observed climate changes which have accompanied the enhancement of the natural greenhouse effect have been considerably smaller than they were originally forecast to be and that they were likely to remain similarly small.

Dr. Field testified on plant physiology and physics of CO_2 in the atmosphere and emphasized four points: (1) atmospheric CO_2 is essential for life on Earth: (2) the concentration of CO_2 in the atmosphere has increased dramatically over the last century; (3) increas-

ing atmospheric CO_2 has a mixture of positive and negative effects on plant growth, food security, and natural ecosystems; (4) the problem of increasing CO_2 will almost certainly not be completely solved through increased plant growth.

Dr. Idso testified on CO_2 and on the positive effects its rising atmospheric concentration has on plant growth and ecosystem biodiversity. He made the following points:

- *CO_2* is not a pollutant. It is the antithesis of a pollutant; this gas is one of the primary raw materials out of which plants construct their tissues. Rather, CO_2 functions as one of the twin pillars of Earth's biosphere.
- The science of atmospheric CO_2 enrichment demonstrates that plants grow better with more CO_2 in the air.

4.3(r)—Superfund RD&D

October 21, 1999

Hearing Volume No. 106–49

Background

On October 21, 1999, the Subcommittee on Energy and Environment held a hearing entitled, "Superfund RD&D." This hearing examined the effectiveness of Superfund Research, Development and Demonstration (RD&D) and examined possible legislative changes to the EPA's RD&D programs.

The 106th Congress has considered amendments to Superfund (Comprehensive Environmental Response, Compensation, and Liability Act of 1980, or CERCLA (P.L 96–510)). The Science Committee has jurisdiction over portions of Superfund RD&D authorized by Section 209 of the 1986 Superfund Amendments and Reauthorization Act, or SARA (P.L. 99–499).

Section 209 of SARA amended CERCLA by adding a section 311, which addresses Superfund RD&D. Section 311 directed the establishment of: (1) a Superfund basic research and training program within the National Institute of Environmental Health Sciences (NIEHS), an institute of the National Institutes of Health, under Section 311(a); (2) an alternative or innovative treatment technology R&D program under Section 311(b); (3) an EPA hazardous substance research program under Section 311(c); and (4) university hazardous substance research centers under Section 311(d).

SARA also amended CERCLA by adding a Section 111(n), which authorized specific levels of appropriations from the Superfund Trust fund to carry out Section 311 RD&D activities. As amended by Section 6301 of the Omnibus Budget Reconciliation Act of 1990 (P.L. 101–508), these are as follows:

(1) $3.0 million for FY 1987, $10.0 million for FY 1988, $20.0 million for FY 1989, $30.0 million for FY 1990, and $35.0 million for each of FY 1991–1994 for activities under Section 311(a), with not more than 10 percent allowed for use for training;

(2) Not more than $20.0 million each of FY 1987–FY 1994 for activities under Section 311(b), other than for basic research; and,

(3) Not more than $5.0 million for each of FY 1987–1994 for activities under Section 311(d).

Witnesses included: The Honorable Norine E. Noonan, EPA Assistant Administrator for Research and Development; Dr. Edgar Berkey, Committee on Environmental Engineering, EPA Science Advisory Board (SAB); Dr. Peter B. Lederman, Interim Executive Director, Northeast Hazardous Substance Research Center (HSRC); and Mr. Tony Davenport, Co-Chairperson, Victory Heights/Maple Park Advisory Council.

Summary of hearing

Dr. Noonan testified that the Superfund RD&D program has been an unqualified success in reducing the costs and increasing the speed and effectiveness of Superfund site cleanups. She cited several examples of how new technologies have been used to reduce the cost of a variety of Superfund sites. She described the three areas that have been improved via Superfund RD&D efforts: (1) better risk assessment methods; (2) new site characterization and remediation methods; and (3) remediation technology. She indicated that the Administration felt that no changes were required in the Superfund authorization regarding RD&D.

Dr. Berkey testified on the SAB's findings and, in particular, on the Superfund RD&D programs including the Superfund Innovative Technology Evaluation (SITE) program. He said that the SAB found that the SITE program has impressive accomplishments that are very much in line with recommendations made by the SAB 15 years ago. He echoed many of the comments made by Dr. Noonan about the reductions of costs and improvements seen from Superfund RD&D. However, he cited the need for better figures on cost savings from EPA and the need for the Agency to disseminate information on successful technologies more widely to those that can use it effectively.

Dr. Lederman testified on the role of the Hazardous Substance Research Centers (HSRC), a consortium of universities and the federal government, in the Superfund RD&D effort. He said that the HSRC's have expanded their efforts beyond integrating R&D and technology transfer to include outreach to communities. He spoke of the need to maintain a proper balance between research and outreach and asked for continued financial support from the Committee.

Mr. Davenport spoke on behalf of the neighborhood advisory committee he co-chairs. His community has two Superfund sites, and received assistance from the EPA's Technical Outreach for Communities (TOSC) program. He felt that while the services from TOSC were invaluable, TOSC's outreach program left much to be desired. He said that it was left to the community and its leaders to find TOSC and ask them for help.

4.3(s)—Hearing on H.R. 2819, Biomass Research and Development Act of 1999 and H.R. 2827, National Sustainable Fuels and Chemicals Act of 1999

October 28, 1999

Hearing Volume No. 106–74

Background

On October 28, 1999 the Subcommittee on Energy and Environment held a hearing entitled, "H.R. 2819, Biomass Research and Development Act of 1999 and H.R. 2827, National Sustainable Fuels and Chemicals Act of 1999" to hear testimony on the two bills. The primary purposes of these bills are to direct the Secretaries of Energy and Agriculture to cooperate in promoting biomass RD&D through the creation of an interagency Board and the establishment of a Technical Advisory Committee for the purpose of awarding financial assistance. Both bills authorize $49 million per year beginning in FY 2000 through FY 2005. Representative Mark Udall introduced H.R. 2819 on September 8, 1999. H.R. 2827, introduced by Mr. Ewing on September 9, 1999, is the companion of S. 935, introduced by Senator Lugar on April 30, 1999, and reported by the Senate Committee on Agriculture on October 8, 1999 (S. Rept. 106–179). In addition, H.R. 2827 authorizes $14 million to construct a Department of Agriculture corn-based ethanol research pilot plant.

According to the DOE, bioenergy—whose sources include agricultural and forestry residues and the organic component of municipal and industrial wastes—currently supplies about 3 percent of U.S. energy requirements. For many years, DOE has conducted the Federal Government's largest biomass R&D program. The FY 2000 appropriation totals $72.0 million for DOE's Biomass/Biofuels Energy Systems Program. This includes $32.5 million for DOE's Biomass Power Systems subprogram, which focuses biomass-based power generation; and $39.5 million for DOE's Biofuels Energy Systems Transportation subprogram, which focuses on the production of biomass-based liquid transportation fuels.

Witnesses included: The Honorable Dan W. Reicher, DOE Assistant Secretary for Energy Efficiency and Renewable Energy; The Honorable I. Miley Gonzales, Under Secretary for Research, Education and Economics, U.S. Department of Agriculture (USDA); Professor Bruce E. Dale, Chairman, Department of Chemical Engineering, Michigan State University and Co-Chair, Committee on Biobased Industrial Products, National Research Council; and Mr. Steve Clemmer, Senior Analyst, Union of Concerned Scientists (UCS).

Summary of hearing

Mr. Reicher testified on the DOE's ongoing commitment to achieve the President's goal of tripling U.S. use of biobased products and bioenergy by 2010 and on DOE's R&D efforts. Regarding the proposed legislation, Mr. Reicher's statement recommended the following:

• H.R. 2827 should be less prescriptive with respect to specific research categories, and should not earmark funding for a corn-based ethanol research pilot plant.

• The composition of the Technical Advisory Committee in H.R. 2819 is preferred to that contained in H.R. 2827.

• H.R. 2819 should be less prescriptive with respect to the "Uses, Grants, Contracts, and Financial Assistance" allowing granting agencies more latitude in financial awards.

Dr. Gonzales testified on the USDA's biomass research-including its focus on cost-reduction technologies-and collaboration with the DOE. Regarding the proposed legislation, Dr. Gonzales recommended the following:

• The Technical Advisory Committees should have representation from all sectors involved in biobased products and bioenergy.

• The established Board should be co-chaired by USDA and DOE.

• Formal rulemaking should be deleted from the bills in favor of USDA procedures that ensure fair competition for funding based on scientific merit.

Dr. Dale's comments included the following:

• For cost-effective large-scale production of biobased products, the "resistance" of cellulosic materials to biological conversion must be overcome.

• Fundamental research should focus on applications of greatest cost-reduction potential, and not just on "interesting scientific problems."

• Empirical and analytical tools are available to evaluate research alternatives to determine which have the most significant cost reduction potential.

• Demonstration "is not ripe" since more biomass conversion RD&D is required.

• H.R. 2827 is preferred over H.R. 2819.

Mr. Clemmer presented the UCS's supportive policies regarding biomass as fuel sources for energy and electricity production, and bio-product production, including the following:

• Federal RD&D funding is key, along with other policies, to lower costs since these technologies have commercialization difficulty without guarantee of stable markets.

• Positive and negative environmental impacts of increased biomass use should be studied, particularly biofuel versus other substitutes for RFG and MTBE in California.

• There should be minimum renewable energy content or portfolio standards for electricity production and transportation fuels and tax credits for biomass and wind power.

4.3(t)—Fiscal Year 2001 Budget Authorization Request: Department of Energy—Offices of Science; Environment, Safety and Health; and Environmental Management

March 1, 2000

Hearing Volume No. 106–90

Background

On Wednesday, March 1, 2000 the Subcommittee held a hearing titled, "Fiscal Year 2001 Budget Authorization Request: Department of Energy—Offices of Science; Environment, Safety and Health; and Environmental Management." This was the first in a series of hearings to examine the Department of Energy's (DOE) Fiscal Year (FY) 2001 budget request.

Witnesses included: Dr. James F. Decker, Acting Director, DOE Office of Science (SC); The Honorable David M. Michaels, DOE Assistant Secretary for Environment, Safety and Health (EH); and Mr. Dan M. Berkovitz, DOE Deputy Assistant Secretary for Planning, Policy and Budget, Office of Environmental Management (EM).

Summary of hearing

Dr. Decker testified on the $3.151 billion Office of Science budget request. His testimony included the following:

- Some 15,000 scientists from research sectors, academic, industry and federal laboratories use the Office of Science's facilities each year.
- Dr. Decker discussed the status of new facilities and significant upgrades to existing facilities including, Relativistic Heavy Ion Collider, the B Factory, the Fermi Main Injector, the Combustion Research Facility Phase II, and the National Spherical Tokamak.
- Dr. Decker highlighted several outstanding discoveries: evidence the universe's expansion is accelerating; neutrinos have mass indicating a new model of physics; genomic sequencing of a bacterium can survive 600 times more radiation than a human being—possibly leading to discoveries for DNA repair.
- FY 2001 budget request highlights include nanoscale science, understanding microbial cells, bioengineering and high performance computing.
- The request also includes capital equipment, instrumentation, and infrastructure investments in facilities such as the synchrotron light sources and neutron sources.

Dr. Michael's testimony on the $50.8 million EH non-defense budget request (FY01 total request is $166 million) highlighted the following:

- Requested increase reflects two new initiatives—the investigation of safety and health concerns at the three gaseous diffusion plants and the projected costs of a proposed workers compensation program.
- Due to budget reductions, EH is no longer providing technical assistance to line management programs.
- EH's program to identify victims of chronic beryllium disease has resulted in legislation, H.R. 3418, to provide compensation. The

bill includes some workers at the Paducah Gaseous Diffusion Plant and at Oak Ridge.

• Continuing support for the Radiation Effects Research Foundation's studies of A-bomb survivors in Hiroshima and Nagasaki and for study of the population and workers exposed to radiation from nuclear weapons production in the Russian Federation.

• Medical surveillance and care for the citizens of the Republic of the Marshall Islands and environmental monitoring from exposure to radioactive fallout from the 1954 thermonuclear weapons test.

Mr. Berkovitz discussed the $286 million non-defense request for EM (FY01 total request is $6.3 billion) and said the following:

• Weldon Springs clean-up completion date is in 2003.

• Completed clean-up at Ames Laboratory and the Princeton Plasma Physics Laboratory and clean-up of the Grand Junction site will be completed in FY01.

• EM has completed clean-up of seventy-four sites, with thirthy-nine remaining, including defense.

• West Valley vitrification of high-level waste completed in 2001.

• At Brookhaven National Laboratory treating groundwater, excavating on-site soil and developing a design to excavating off-site sediments is underway.

• Complete transfer of spent nuclear fuel to safe storage at Idaho National Lab.

• Reorganization of headquarters to promote accountability of all managers, to resolve cross-site issues, and to integrate operations across sites.

• Continue Science R&D investments that have resulted in over 500 deployments of new technologies.

4.3(u)—Fiscal Year 2001 Climate Change Budget Authorization Request

March 9, 2000

Hearing Volume No. 106–94

Background

On March 9, 2000 the Subcommittee on Energy and Environment held a hearing entitled, "Fiscal Year 2001 Climate Change Budget Authorization Request."

Witnesses included: The Honorable D. James Baker, Ph.D., Chair, National Science and Technology Council Subcommittee on Global Change Research, and Administrator, National Oceanic and Atmospheric Administration and Under Secretary for Oceans and Atmosphere, U.S. Department of Commerce; The Honorable Dan W. Reicher, DOE Assistant Secretary for Energy Efficiency and Renewable Energy (EERE); and Mr. Paul M. Stolpman, Director, Office of Atmospheric Programs, Office of Air and Radiation, U.S. Environmental Protection Agency.

Summary of hearing

D. James Baker, Ph.D., testified on planned research and monitoring programs under the $1.74 billion Global Climate Change Research Program. He spoke of new initiatives to better understand

the water cycle and the carbon cycle. He also spoke of the importance of enhanced climate modeling systems and better computer systems to run them.

Mr. Dan W. Reicher testified on the CCTI's role in reducing energy consumption and improving U.S. competitiveness and air quality. He spoke about the decline in costs per kilowatt-hour for renewable energy sources, the increase in use of energy efficient technologies in power plants, and the Nuclear Electric Plant Optimization program. He also testified on the biobased products initiative, which is designed to reduce the use of fossil energy and aid the farm economy, and concluded with a discussion of weatherization programs funded by the DOE.

Mr. Paul M. Stolpman testified the CCTI has contributed to reductions in greenhouse gas emissions and energy consumption. EPA is involved in programs to develop hybrid vehicles that reduce emissions and are expected to deliver eighty miles per gallon. EPA is also attempting to reduce energy consumption in schools and is claiming that 400 school districts have saved $270,000,000 since 1995.

4.3(v)—Fiscal Year 2001 Budget Authorization Request: Department of Energy—Offices of Energy Efficiency and Renewable Energy; Fossil Energy; and Nuclear Energy, Science and Technology

March 16, 2000

Hearing Volume No. 106–90

Background

On March 16, 2000 the Subcommittee on Energy and Environment held a hearing entitled, ''Fiscal Year 2001 Budget Authorization Request: Department of Energy—Offices of Energy Efficiency and Renewable Energy; Fossil Energy; and Nuclear Energy, Science and Technology.'' This was the second in a series of hearings to hear testimony on the justification of the Department of Energy's (DOE) FY 2001 budget request.

Witnesses included: The Honorable Dan W. Reicher, DOE Assistant Secretary for Energy Efficiency and Renewable Energy (EERE); Mr. Robert Kripowicz, DOE Principal Deputy Assistant Secretary for Fossil Energy; and Mr. William Magwood, IV, Director, DOE Office of Nuclear Energy, Science and Technology.

Summary of hearing

Mr. Reicher discussed the EERE budget request of $1,039.532 million and noted the following in his testimony:

- Domestic oil production has declined, and demand has increased dramatically, particularly for light and heavy trucks.
- The Partnership for a New Generation of Vehicles has led to developments in hybrid engine systems, fuel cell engine systems, decreasing the weight of vehicles, and advanced batteries.
- The cost of wind energy in 1979 was 40 cents per kilowatt hour. Today, the cost of wind energy has been reduced to 4 to 6 cents per kilowatt hour. More megawatts of wind power were installed world-wide in 1999 than megawatts of nuclear power.

• The Department's Building America Project has produced homes that are 30 to 50 percent more efficient than standard new homes, at no additional cost.

Mr. Kripowicz noted the following in his testimony on the Office Fossil Energy's FY 2001 R&D Budget Request of $375.57 million:

• The Fossil Energy budget supports research activities such as developing a pollution-free power plant, affordably capturing and storing greenhouse gases, drilling for hydrocarbons without leaving a footprint, and developing contaminant-free gasoline for peak effectiveness.

• The Office of Fossil Energy has increased funding for the Vision 21 program, a plan to develop a pollution-free power plant fueled by coal, natural gas, or biomass.

• The Fossil Energy budget more than doubles funding for exploratory research into carbon sequestration. Industry partners and eight National Laboratories are focusing efforts on promising carbon sequestration technologies.

• In the area of gas distribution, the Office proposes $13 million to begin developing technology that can make gas delivery more reliable.

Mr. Magwood testified to the Office of Nuclear Energy, Science, and Technology's FY 2001 budget request of $255.045 million.

• U.S. nuclear plants have set an all-time record for the share of electricity generated by nuclear power—almost 23 percent. This exceeds the record set in the mid-1970s when more plants were in operation.

• For nuclear power to expand in the future, several obstacles must be overcome: the cost of constructing new power plants, concerns about proliferation, and dealing with nuclear waste.

• Seven nations have signed on to an agreement to work multilaterally on what is known as Generation IV Nuclear Power Systems. These nuclear systems will be competitive with natural gas and other energy options and make safe nuclear power available to more people world-wide.

• The Office of Nuclear Energy, Science, and Technology is engaged in the development of the use and production of many medical isotopes that are important to the research needs at hospitals and medical clinics across the country. Many of these isotopes will be used to investigate new ways to treat breast and prostate cancer.

• The Department of Energy has provided the power systems needed for space exploration and ongoing national security applications, most recently the Galileo and Cassini spacecraft.

4.3(w)—Fiscal Year 2001 Budget Authorization Request: Environmental Protection Agency (EPA) Science and Technology (S&T) Budget

March 23, 2000

Hearing Volume No. 106–85

Background

On March 23, 2000 the Subcommittee on Energy and Environment held a hearing entitled, "Fiscal Year 2001 Budget Authoriza-

tion Request: Environmental Protection Agency (EPA) Science and Technology (S&T) Budget.''

Witnesses included: The Honorable Norine E. Noonan, Assistant Administrator, Office of Research and Development, U.S. Environmental Protection Agency; Dr. W. Randall Seeker, Chairman EPA Science Advisory Board's Research Strategies Advisory Committee (RSAC); and Mr. David G. Wood Associate Director, Environmental Protection Issues Resources, Community, and Economic Development Division, U.S. General Accounting Office (GAO).

Summary of hearing

Dr. Noonan testified primarily on the $530 million request for the Office of Research and Development (ORD). She spoke about efforts within ORD to more closely align research efforts with regulatory needs as well as longer term ''core research needs.'' She also testified on the Science to Achieve Results (STAR) Program and efforts to use STAR grants to bolster areas that have unmet research needs.

Dr. Seeker addressed major issues in the budget, examined in three RSAC formal reviews conducted over the last year. These reviews included examination of the FY 2001 EPA Science and Technology Budget Request, STAR grant program, and the review of the EPA Peer Review Policy and Procedures. All of these reviews are related to how EPA plans and executes science. He noted the Agency has continued to make marked improvements in the budget and planning process and had also improved alignment between research and research needs. He also spoke about peer review at EPA, stating that ''it is much more difficult to question the quality of the Agency's science base when scientific products used to support decision-making undergo independent scientific peer review.''

Mr. Wood testified on improvements in the presentation of the EPA's budget justification, but said the GAO had identified several specific areas that still needed improvement.

4.3(x)—Fiscal Year 2001 Budget Authorization Request: National Oceanic and Atmospheric Administration

March 29, 2000

Hearing Volume No. 106–86

Background

On March 29, 2000 the Subcommittee on Energy and Environment held a hearing entitled, ''Fiscal Year 2001 Budget Authorization Request: National Oceanic and Atmospheric Administration.''

Witnesses included: The Honorable D. James Baker, Ph.D., Administrator, National Oceanic and Atmospheric Administration and Under Secretary for Oceans and Atmosphere, U.S. Department of Commerce; Mr. Steven J. Brown, Acting Associate Administrator for Air Traffic Services, Federal Aviation Administration (FAA); and Mr. Joel C. Willemssen, Director, Civil Agencies Information Systems, Accounting and Information Management Division, U.S. General Accounting Office.

Summary of hearing

Dr. Baker testified on the need for increased funding for weather satellite programs, updated ground-based weather data collection, ocean data collection systems and information technology upgrades. He also responded to questions regarding the state-of-science on global climate change. Dr. Baker testified there is still some uncertainty over the scope and the causes of global climate change, and the government must maintain its climate change research programs.

Mr. Brown testified on cooperation between the FAA and the NWS in the area of aviation weather forecasting. He stated this cooperation is critical to leverage resources available to the FAA and NWS in order to enhance aviation safety in the U.S.

Mr. Willemssen testified on GAO's finding that the NWS modernization is "a high-risk information technology investment because of its estimated cost, its complexity, its criticality to NWS's mission of helping to protect life and property through early forecasting and warnings of potentially dangerous weather, and its past problems." He also testified NOAA's Geostationary Operational Environmental Satellite (GOES) launch schedule does not leave much room for a launch or orbital failure.

4.3(y)—The Human Genome Project

April 6, 2000

Hearing Volume No. 106–89

Background

On April 6, 2000 the Subcommittee on Energy and Environment held a hearing entitled, "The Human Genome Project."

Witnesses included: The Honorable Neal F. Lane, Assistant to the President for Science and Technology and Director, Office of Science and Technology Policy; Dr. J. Craig Venter, President and Chief Scientific Officer, Celera Genomics; Dr. Gerald M. Rubin, Howard Hughes Professor of Genetics and Development, University of California, Berkeley and Vice President for Biomedical Research, Howard Hughes Medical Institute; and Dr. Robert H. Waterston, James S. McDonnell Professor and Head, Department of Genetics and Director, Genome Sequencing Center, Washington University School of Medicine.

Summary of hearing

Dr. Lane testified the Administration was very supportive of the Human Genome Project and of the private efforts of companies including Celera. He indicated questions remain over the ethical, legal and social issues (ELSI) of human genetics.

Dr. Venter testified Celera's human genome mapping project was almost completed. He discussed the importance of competition as well as the fruits of cooperation between the public and private sectors. He cited collaboration between Celera, UC Berkeley and the Department of Energy in completing the Drosophila melanogaster genome as an appropriate model for future collaboration. He also

indicated Celera had plans to apply for a limited number of patents, some in conjunction with industry "partners."

Dr. Rubin discussed the successful Drosophila collaboration and the potential for further collaboration between the public and private sector in the future.

Dr. Waterston discussed the importance of continued emphasis on the public program and alleged that without the public project, very little data would be available to genetic researchers. He was concerned that Celera's database will be restricted to paying customers and that companies with genetic patents may restrict not-for-profit research.

4.3(z)—"Strengthening Science at the U.S. Environmental Protection Agency"—National Research Council (NRC) Findings

July 13, 2000

Hearing Volume No. 106–97

Background

On July 13, 2000 the Subcommittee on Energy and Environment held a hearing entitled, "Strengthening Science at the U.S. Environmental Protection Agency"—National Research Council (NRC) Findings." The purpose of the hearing was to consider the findings of a recently published report by the NRC titled Strengthening Science at the U.S. Environmental Protection Agency.

Witnesses included: Dr. David Morrison, member of the NRC Committee on Research and Peer Review in EPA and Adjunct Professor at North Carolina State University; and Dr. Robert J. Huggett, Vice President for Research and Graduate Studies, Michigan State University, and former Assistant Administrator, EPA Office of Research and Development (ORD).

Summary of hearing

The hearing was called to consider the findings of the National Research Council Report (NRC) on science at the Environmental Protection Agency (EPA). The report was the fourth and final installment of a congressionally-mandated inquiry into the quality and performance of the science mission within the EPA.

Dr. Morrison summarized the NRC panel findings in his testimony. Among the significant changes called for in the report are the creation of a new Deputy Administrator for Science and Technology; changing the position of Assistant Administrator for Research and Development (ORD) to a six-year appointment and increasing the ORD's authority over all science at the EPA; and improving peer review by removing the appearance of conflicts of interest.

Dr. Huggett added his support to the NRC findings while reflecting on some of the changes that were made at EPA while he was AA for ORD. These changes included a reorganization of ORD, an attempt to better coordinate research with Agency regulatory needs and a better balance between regulatory and core research programs.

4.3(aa)—Subcommittee on Energy and Environment: Reexamining the Scientific Basis for the Linear No-Threshold Model of Low-dose Radiation

July 18, 2000

Hearing Volume No. 106–98

Background

On July 18, 2000, the Subcommittee on Energy and Environment held a hearing entitled, "Reexamining the Scientific Basis for the Linear No-Threshold Model of Low-dose Radiation."

Witnesses included: Ms. Gary L. Jones, Associate Director, Energy, Resources and Science Issues, General Accounting Office (GAO); Dr. Paul S. Rohwer, President, Health Physics Society (HPS); Mr. Charles B. Meinhold, President, National Council on Radiation Protection and Measurements (NCRP); and Dr. Steven B. Wing, Associate Professor of Epidemiology, School of Public Health, University of North Carolina.

Summary of hearing

The Subcommittee met to receive testimony on recommendations by the GAO for legislative action contained in a GAO investigation of the scientific basis for the Linear No-Threshold (LNT) model for low dose radiation and the technological requirements and costs to meet existing and proposed standards.

Ms. Jones testified on the GAO report, which concluded: (1) "U.S. regulatory standards to protect the public from the potential health risks of nuclear radiation lack a conclusively verified scientific basis"; (2) the Nuclear Regulatory Commission and Environmental Protection Agency, the two regulatory bodies, are unable to agree on radiation standards at Yucca Mountain (nuclear high level waste repository) and for decommissioning of the 112 commercial nuclear power plants; (3) the lower the standard the greater the escalation of the costs for clean-up; and (4) Congressional action is necessary to resolve the regulatory agencies' impasse.

Dr. Rohwer said, "Health risks of radiation exposure can only be estimated with a reasonable degree of scientific certainty at radiation levels that are orders of magnitude greater than levels established by regulators for protection of the public and that there is not scientific certainty below these levels." He also said "[q]uantification of risks using the LNT model below approximately 10 rem is inappropriate."

Mr. Meinhold, said nearly completed reassessment by NCRP of the scientific basis for the LNT finds that "there is no conclusive evidence on which to reject the assumption of a linear-nonthreshold relationship," but "the exact shape of the dose response relationship . . . is not known." He concluded his testimony by stating since a wide range of scientific opinion exists regarding the shape of the dose response curve, the NCRP disregards the extremes of the distribution of opinion. In this case, the LNT is believed to be the most appropriate model in the absence of conclusive evidence of any other dose-response curve.

Dr. Wing stated the LNT model was far too lenient a model on which to base standards given the conclusions of his own research. He advocated a model that yields much more stringent standard regardless of the cost of clean-up.

4.3(bb)—Nuclear Energy's Role: Improving U.S. Energy Security and Reducing Greenhouse Gas Emissions

July 25, 2000

Hearing Volume No. 106–99

Background

On July 25, 2000, the Subcommittee on Energy and Environment held a hearing entitled, "Nuclear Energy's Role: Improving U.S. Energy Security and Reducing Greenhouse Gas Emissions."

Witnesses included: Dr. John P. Holdren, Harvard University and Chair, President's Committee of Advisors on Science and Technology (PCAST) Panel on International Cooperation in Energy Research, Development, Demonstration, and Deployment; Dr. James J. Duderstadt, University of Michigan, and Chair, U.S. Department of Energy, Nuclear Energy Research Advisory Committee; Mr. Richard Rhodes, Author and Historian and 1988 Pulitzer Prize in Nonfiction for The Making of the Atomic Bomb; and Ms. Maureen Koetz, Director of Environmental Policy, Nuclear Energy Institute.

Summary of hearing

Dr. Holdren stated the challenge facing the United States and the world to reduce environmental pollutants, including greenhouse gases, while producing energy necessary for economic growth. He agreed nuclear energy meets both these criteria, but expressed his concern that nuclear waste be managed to avoid proliferation and stated he is opposed to recycling used nuclear fuel.

Dr. Duderstadt focused his testimony on the need to promote science and engineering programs at universities, including providing R&D funding to these programs. He cited the declining numbers of graduates in these disciplines and projected technical worker shortfalls.

Mr. Rhodes described how he had once been quite skeptical of nuclear energy as a young reporter. He related how during the course of investigating the industry and researching material for his several books on the subjects of nuclear weapons, he grew to be a strong supporter of nuclear energy as the best way to meet growing demand for clean energy.

Ms. Koetz described how the use of nuclear energy "avoids" huge volumes of pollutants emitted to the environment when nuclear energy is employed rather than fossil fuels for the production of electricity.

4.3(cc)—The State of Ocean and Marine Science

July 27, 2000

Hearing Volume No. 106–100

Background

The purpose of this joint hearing with the Subcommittee on Basic Research was to review federal support for the Ocean Sciences. Topics of the hearing included: ocean research activities supported by the National Science Foundation (NSF) and the National Oceanic and Atmospheric Administration (NOAA), the Academic Fleet and the University-National Oceanographic Laboratory System (UNOLS), and other issues of concern to the ocean research community.

The Subcommittee received testimony from Admiral James Watkins, President, Consortium for Oceanographic Research and Education (CORE); Dr. Robert Knox, Associate Director, Scripps Institution of Oceanography and Chair, University-National Oceanographic Laboratory System (UNOLS) Council; Dr. James Delaney, Professor of Oceanography, University of Washington; and Dr. Jack Sobel, Center for Marine Conversation.

Summary of hearing

Admiral Watkins opened his testimony by noting the importance of ocean research given more than half of the world's population lives in the 2 percent of the Earth's surface that is coastal zone and there are increasing concerns about the biological health of the oceans. He also explained the importance of ocean research in understanding the development and effects of natural disasters, including hurricanes, monsoons, typhoons and tsunamis. In addition, he noted the important role the oceans play in the realm of national defense. He suggested a system of sustained integrated ocean observations would address fundamental scientific questions regarding the interacting physical, biological, chemical and geological processes in the oceans, and their relationship to the human population that relies on them. He said building on the existing infrastructure, a multi-sector commitment involving the Federal Government, State governments, the private sector and academia, would lead to a national capability within 10 years.

Dr. Knox testified on the current status of UNOLS. He noted UNOLS is a successful system yielding highly cost-effective seagoing capability for the U.S. ocean science community. In addition, he explained the question of how to renew the UNOLS fleet in concert with a long-range view of scientific requirements-including a realistic view of funded future uses for the fleet-confronts agencies, UNOLS institutions, and several Committees of Congress. With intelligent cooperation, he noted, we can plan this future well, enhancing the UNOLS fleet. He said he believed the Federal Oceanographic Facilities Committee (FOFC) with its new reporting relationship to the National Ocean Research Leadership Council bodes well for a new round of fleet renewal planning. He urged Congress to resist altering the "roadmap" FOFC and UNOLS have created in funding research in oceanography.

Dr. Delaney made three points in his testimony: (1) the tide is rising in the world of oceanographic research; (2) life exists deep within our planet and perhaps within others; and (3) we are on the threshold of a new type of Interactive Oceanography. He reviewed his research of volcanically-supported biospheres on the ocean floor. He proposed further research projects similar to his NEPTUNE project, an undersea observatory based on electro-optical networking that connects through the Internet to many remote, interactive natural laboratory nodes. These labs would be designed for real-time, four-dimensional experiments on, above, and below the sea floor. He noted this type of research represents the shift, in his view, of ocean research from an exploratory-based model to an understanding-based model.

Dr. Sobel testified on the current state of coral reef science. He explained that our current knowledge of coral reefs is sufficient to state unequivocally that they are among the most biologically diverse biosystems on earth, they possess high value to human beings if properly preserved, they face a number of serious stresses that have the potential to cause greater impacts over the next several decades, they face a number of well-documented threats, and the application of existing management tools can limit the impacts of these threats and stresses. He noted the U.S. Coral Reef Task Force and its National Action Plan to Conserve Coral Reefs represent the best opportunity to protect coral reefs, and urged further funding of these projects.

4.4—Subcommittee on Space and Aeronautics

4.4(a)—FY 2000 Budget Request: The Sciences at NASA

February 11, 1999

Hearing Volume No. 106–8

Background

On February 11, 1999, the Subcommittee on Space and Aeronautics held its first authorization hearing entitled, "FY 2000 Budget Request: The Sciences at NASA." Witnesses included: Dr. Edward Weiler, Associate Administrator for Space Science, NASA; Dr. Ghassem Asrar, Associate Administrator for Earth Science, NASA; Dr. Arnauld E. Nicogossian, Associate Administrator for Life and Microgravity Sciences and Applications, NASA; and Dr. Claude Canizares, Chairman of the National Research Council's Space Studies Board.

Summary of hearing

The hearing was intended to profile NASA's science programs in the context of the President's FY 2000 budget request. Testimony before the Subcommittee focused on: (1) new initiatives in the offices of Space Science, Life and Microgravity Sciences and Applications, and Earth Science as laid out in the FY 2000 budget; (2) an explanation of problems occurring within Space Science, Life and Microgravity Sciences and Applications, and Earth Science programs and NASA's plans for resolving them; (3) a summary of the manner in which the offices of Space Science, Life and Microgravity

Sciences and Applications, and Earth Science and their priorities have changed in response to the Government Performance and Results Act; (4) a summary of NASA's accomplishments during the past year and those goals it hopes to achieve in FY 2000; (5) a summary of the Space Studies Board's report "Supporting Research and Data Analysis in NASA's Science Programs;" and finally, (6) recommendations about improving the management of research funds within NASA to ensure that each individual mission's potential to contribute to our knowledge base is fully utilized.

Dr. Edward Weiler, Associate Administrator for Space Science, NASA, began his testimony by profiling several recent Space Science highlights through the utilization of the Committee on Science's multimedia displays in the main hearing room. Visual graphics were used to display photographs taken by the Hubble Telescope of a collision between an elliptical galaxy and a spiral galaxy. This phenomenon is of particular interest because of the resulting birth of stars and the existence of a super massive black hole at the center of the galactic collision. Hubble Telescope pictures were also displayed of the faintest and farthest objects ever observed by humans. Additional images included a new class of stars discovered by the Gamma Ray Observatory, Coronal Mass Ejection Events, the Mars Polar Lander, Mars Climate Orbiter, and the Mars Global Surveyor. Five new Space Science activities were identified in the President's FY 2000 budget. These programs included Mars Network communications capabilities, Mars Micromissions, Self-Sustaining Robotic Networks, Gossamer Spacecraft, and Next Decade Planning.

Dr. Arnauld E. Nicogossian, Associate Administrator for Life and Microgravity Sciences and Applications, highlighted the major accomplishments of 1998: (1) the results of Neurolab to be presented in April 1999 at the National Academy of Science's Symposium on the Decade of the Brain; (2) the findings discovered from the Mir studies regarding bone mass loss; (3) research conducted on infectious diseases by the NASA ground-based bioreactor at the NASA/NIH Center for Three-Dimensional Tissue Culture; and (4) work on evaluating distant learning, consultation, and surgical training technology for a potential virtual hospital. He testified the most important challenge facing Life and Microgravity Sciences and Applications will be to develop and sustain their research community while resources are focused on the International Space Station (ISS).

Dr. Ghassem Asrar, Associate Administrator for Earth Science, described several examples of science and application results within the Earth Science Enterprise's Topical Rainfall Measuring Mission (TRMM). For the first time scientists can (1) accurately measure precipitation over the global tropical ocean; (2) measure lightning strikes on a global scale; (3) record algae blooms in the world's oceans; and (4) bring this data to users such as farmers, fisheries, and federal agencies by utilizing the Internet. Dr. Asrar summarized his testimony by stating the Earth Science Enterprise balances funding across observation, research and data analyses, applications, and advanced satellite technology to ensure the Nation has the tools to answer scientific questions about the Earth.

Dr. Claude Canizares, Chairman of the National Research Council's (NRC) Space Studies Board, focused his testimony on the Space Studies Board's report entitled, "Supporting Research and Data Analysis (R&DA) in NASA Science Programs." The R&DA portions of NASA science activities are very important to NASA's research and these program's contributions include a wide range of NASA science programs. NRC recommends NASA's science offices should use various means to improve their overview of R&DA activities, periodically evaluate their efficiency, and seek a balance among them. Dr. Canizares concluded his testimony by stating that the Space Studies Board has consistently held the best way to assure high quality research at NASA is to: (1) rely heavily on the peer review process; and (2) keep the authority for primary science allocation decisions at NASA Headquarters.

4.4(b)—FY 2000 Budget Request: NASA Posture

February 24, 1999

Hearing Volume No. 106–8

Background

On February 24, 1999, the Subcommittee on Space and Aeronautics held its second authorization hearing entitled, "FY 2000 Budget Request: NASA Posture." NASA Administrator Daniel S. Goldin testified regarding the Fiscal Year 2000 NASA Budget request.

Summary of hearing

The objectives for NASA as laid out by the National Aeronautics and Space Act of 1958 include: expansion of human knowledge; improvement of aeronautical and space vehicles; development of vehicles to travel through space; sharing of knowledge between military and civilian space communities; international cooperation; and the preservation of the United States' role as a leader in aeronautics, space science, and technology. The Subcommittee on Space and Aeronautics is responsible for overseeing and authorizing appropriations for all the activities within NASA. The purpose of this hearing was to receive testimony from the Administrator regarding the President's Fiscal Year 2000 budget submit for the agency.

Administrator Goldin testified the President's FY2000 budget request of $13.5 billion will give America a robust space and aeronautics program. Utilizing the Science Committee's multimedia displays in the committee's main hearing room, Mr. Goldin's testimony focused on: (1) the launch of the first two elements of the International Space Station (ISS)—the Functional Cargo Block (FGB) and the Unity node; (2) Space Science highlights included—the Lunar Prospector, Deep Space 1, the Stardust mission, and the Chandra observatory; (3) Earth Science highlights included—Landsat 7, Quikscat, and Pathfinder programs; (4) the current status of the Reusable Launch Vehicle (RLV) program's flagship the X–33; and (5) information on ISS's impact on other programs. Mr. Goldin then continued his testimony with NASA's future plans. These plans included: (1) an intelligent synthetic environment at NASA for research and development; (2) future experiments aboard

ISS once it is completed; (3) a virtual presence throughout the solar system with a fleet of ever-smaller robotic spacecraft; (4) the Next-Generation Space Telescope; (5) an Interplanetary Internet; (6) future Earth Science programs to help better understand our planet; (7) developing aeronautical technology to help reduce fatal aircraft accident rates by a factor of 5 in 10 years and by a factor of 10 in 20 years; (8) the Ultra-Efficient Engine Technology program to reduce fuel consumption and improve performance; and finally (9) the X–34 program to test rocket technology at speeds up to Mach 10. The NASA Administrator summarized his testimony by explaining that because NASA doesn't think small and plans for the long term, the agency's budget is an investment in the next millennium.

4.4(c)—FY 2000 Budget Request: Human Space Flight

February 25, 1999

Hearing Volume No. 106–8

Background

On February 25, 1999, the Subcommittee on Space and Aeronautics held its third authorization hearing entitled, "FY 2000 Budget Request: Human Space Flight." Witnesses included: Mr. Joe Rothenberg, Associate Administrator, Office of Space Flight, NASA; Mr. Richard D. Blomberg, Chairman, Aerospace Safety Advisory Panel; Dr. James D. Richardson, Study Director, Potomac Institute for Policy Studies; and Ms. Marcia Smith, Specialist in Aerospace and Telecommunications Policy, Congressional Research Service.

Summary of hearing

The hearing was intended to profile NASA's Human Space Flight Office in the context of the President's FY 2000 budget request. Testimony before the Subcommittee focused on: (1) funding requirements for the International Space Station (ISS) in FY 2000 and beyond; (2) management challenges in terms of Russia's continuing failures to honor its obligations to the ISS partnership; (3) NASA's plans to commercialize ISS; (4) the steps NASA is taking to ensure that life and microgravity science opportunities are maximized during ISS assembly; (5) the development status of ISS; (6) the prospect for additional changes to the design of ISS through the end of the program; (7) the status and progress of Shuttle upgrade efforts; (8) changes in the Shuttle workforce composition, including past and anticipated workforce reductions; (9) the impact on the Shuttle launch schedule of any additional delays in or changes to ISS assembly sequence; and (10) the status of phase 4 upgrades to the Space Shuttle.

Mr. Joe Rothenberg, Associate Administrator, Office of Space Flight, NASA, testified with the exception of Russia, the International Space Station's (ISS) partners are delivering their hardware on time. Mr. Rothenberg reported he has taken management steps to control the annual costs as well as the total cost of ISS. These included: (1) establishment and budgeting for a more realistic development and assembly complete schedule; and (2) a Head-

quarters Center Contractor Cost Management Team which has weekly insight into prime contractor costs. He assured the Subcommittee that rephasing of the research facility developments has not cut the research and analysis portion of the budget and the higher priority facilities, human research, biotechnology, and gravitational biology facilities, have been maintained. In order to provide more research opportunities during assembly Mr. Rothenberg reported he is reviewing the Space Shuttle manifest and they have added STS–107 as a dedicated research flight. Mr. Rothenberg also reported on the accomplishments and status of the Space Shuttle fleet including: (1) five successful Space Shuttle flights in 1998; and (2) the super light weight external tank and the new SSME Block II engine have increased the Space Shuttle's performance.

Mr. Richard D. Blomberg, Chairman, Aerospace Safety Advisory Panel, summarized the activities of the Aerospace Safety Advisory Panel. Mr. Blomberg reported the panel believes safety in the short term is well served but raised concerns about the future. These concerns included: (1) scheduled staff reductions will affect the Space Shuttle and the International Space Station (ISS) programs unless retiring experienced personnel are replaced with adequately trained staff; (2) the Space Shuttle and ISS are hampered by a dearth of physical resources with which to meet contingencies; (3) the Extra-Vehicular Activity (EVA) project lacks sufficient operational assets to meet unplanned contingencies (EVA crews should be provided with additional radiation and meteoroid shielding, and a better understanding of Russian EVA training procedures and protocols is needed); (4) Space Shuttle and ISS hardware are largely obsolete but not unsafe (newer technology would likely significantly reduce safety risks); and (5) new General Purpose Computers (GPC) are needed for the Space Shuttle fleet because the existing devices are outmoded and not upgradable.

Dr. James D. Richardson, Study Director, Potomac Institute for Policy Studies, summarized the Potomac Institute's study on commercialization of the International Space Station which was completed in early 1997. The study found commercialization of human orbital space could yield significant benefits. He reported the benefits of NASA's mission through commercialization include: (1) better and more affordable space assets; (2) increased utilization of the Space Shuttle, the ISS, and any future RLVs; (3) release of NASA's resources for applications to new science frontiers; (4) leveraged private investment; (5) improved innovation and importation of commercial technology to space endeavors; and (6) increased public support for space operations. The national benefits of commercialization were listed as: (1) enhancement of U.S. industry competitiveness; (2) spin-offs of new technologies to non-space industries; and finally (3) national prestige. Opportunities for space-based commercial ventures involved privatization of government functions of the ISS, commercial research ventures including biomedicine and materials, and near-term commercial opportunities in education, entertainment, and advertisement. Major problems with commercialization ventures were cited as high launch and operations costs, low flight frequency, long launch lead times, and expensive indemnification against flight failure. The Potomac Insti-

tute's study concluded a strategy of privatization to commercialization is a logical means of achieving NASA's goals.

Ms. Marcia Smith, Specialist in Aerospace and Telecommunications Policy, Congressional Research Service, testified the Space Station program, as it began in 1984, was originally estimated to cost $8 billion. That program was terminated in 1993 and replaced with the International Space Station (ISS) program at an estimated cost of $17.4 billion. However, since 1998, that estimate has risen to between $23.4 billion and $26 billion depending on whether assembly can be completed by June, 2004 or October, 2005. The original completion date was June, 2002. The major components of the ISS cost increases include: (1) the Crew Return Vehicle (CRV) at a cost of $1.04 billion; (2) Russian program assurance, for which NASA has added $800 million; (3) extra funding to cover U.S. cost overruns, an example of which was Boeing's cost overrun of $828 million; (4) additional cash payments to Russia, including a $200 million transfer to Russia for ISS cooperation; and (5) an estimated $3 billion in costs associated with schedule slips. Ms. Smith identified two enacted policies that could have increased costs. The first was the requirement to build the ISS with a flat budget of $2.1 billion per year and second came the decision to place the Russians in the critical path of the program. Ms. Smith concluded her testimony by suggesting that a council on ISS and commercialization be established to address three fundamental issues: (1) what is meant by commercialization and privatization; (2) what are the goals of commercialization or privatization and how will they be measured; and (3) do all the international partners need to agree on the above or can the answer be different for each one?

4.4(d)—FY 2000 Budget Request: Aero-Space Technology

March 3, 1999

Hearing Volume No. 106–8

Background

On March 3, 1999, the Subcommittee on Space and Aeronautics held its fourth authorization hearing entitled, "FY2000 Budget Request: Aero-Space Technology." Witnesses included: Mr. Sam Armstrong, Associate Administrator, Office of Aero-Space Technology, NASA and Mr. Gary Payton, Deputy Associate Administrator (Space Transportation Technology), Office of Aero-Space Technology, NASA.

Summary of hearing

The hearing was intended to examine NASA's Aero-Space Technology Enterprise in the context of the President's FY2000 budget submission. Testimony before the Subcommittee focused on: (1) NASA's role in the Administration's Aviation Safety Initiative; (2) progress made on the initiative's goals to date; (3) the Administration's termination of NASA's High Speed Research program and the Advanced Subsonic Technology program, and the implications these cancellations have for the future of aeronautical research at NASA; (4) NASA's three new focused programs in aeronautics, and the rationale for their initiation; (5) the status of, plans, and fund-

ing requirements for NASA's current space transportation technology programs, including X–33 and X–34; (6) the status of, plans, and funding requirements for Future-X; (7) the role of the Advanced Space Transportation Program as a wellspring of technology for government and commercial application; (8) current plans regarding NASA support for the commercial space transportation industry, including VentureStar; and (9) current plans regarding NASA support for the Department of Defense, including the Military Space Plane initiative.

Mr. Sam Armstrong, Associate Administrator, Office of Aero-Space Technology, NASA, utilized the Science Committee's multimedia displays to highlight the accomplishments of the Office of Aero-Space Technology. These accomplishments included: (1) the unmanned Pathfinder aircraft's record flight to 80,000 feet; (2) highspeed flight research conducted on the TU–144 Russian Supersonic Transport; (3) improved airport ground handling and taxi instructions for aircraft; (4) development of a laser radar used to detect clear air turbulence; (5) the Ultra-Efficient Engine Technology program; (6) synthetic vision; and (7) the X–34 hypersonic test vehicle.

Mr. Gary Payton, Deputy Associate Administrator (Space Transportation Technology), Office of Aero-Space Technology, NASA, testified that the X–34 hypersonic test vehicle was currently undergoing testing at Dryden Flight Research Center. The Reusable Launch Vehicle (RLV) program's X–33 launch site at Edwards AFB has been completed ahead of schedule and below cost. The X–33 itself is still in a state of assembly and its aerospike engine is running six months behind schedule. Problems with the composite liquid hydrogen tank have forced the first flight to move to the summer of 2000. Mr. Payton further testified that the X–37 has been selected as the first of the Future X programs. NASA plans to fly the X–37 in a Space Shuttle, deploy the vehicle for 2 to 3 days on orbit, and have it return to Earth under its own command. Additionally, recent ground tests of the rocket-based combined cycle engine have produced results that may lead to a potentially more cost-effective launch system. Mr. Payton summarized his testimony by stating the main objective of the Office of Aero-Space Technology is to dramatically decrease the cost of space access.

4.4(e)—FY 2000 Budget Request: Regulations and Operations

March 11, 1999

Hearing Volume No. 106–8

Background

On March 11, 1999, the Subcommittee on Space and Aeronautics held its fifth and final authorization hearing entitled, "FY 2000 Budget Request: Regulations and Operations."

Witnesses included: Mr. Keith Calhoun-Senghor, Director, Office of Space Commercialization, Technology Administration, Department of Commerce; Ms. Patti Grace Smith, Associate Administrator, Office of Commercial Space Transportation, Federal Aviation Administration, Department of Transportation; Mr. Bruce L. Mahone, Director, Office of Space Policy, Aerospace Industries As-

sociation and Mr. Joseph Rothenberg, Associate Administrator, Office of Human Space Flight, National Aeronautics and Space Administration.

Summary of hearing

The hearing was intended to examine NASA's Aero-Space Technology Enterprise in the context of the President's FY 2000 budget submission. Testimony before the Subcommittee focused on: (1) the Office of Space Commercialization's progress and plans for promoting the U.S. commercial space sector; (2) the role of the Office of Space Commercialization in dealing with commercial remote sensing, communications satellite export licenses, and related issues; (3) the problems and challenges facing the U.S. commercial space sector which may require changes in program funding, policy, legislation, or international agreements; (4) an assessment of the U.S. commercial launch industry's state of health and share of the world market; (5) an assessment of the U.S. commercial satellite industry's state of health and share of the world market, particularly as it applies to commercial remote sensing; (6) the projected trends in the U.S. share of the world market for the industries listed above; (7) any suggested regulatory or legislative actions to help preserve the U.S. share of the world market for these industries; (8) a brief overview of the Consolidated Space Operations Contract (CSOC) and the Space Operations Management Office (SOMO); (9) comparing savings levels anticipated from CSOC prior to the contract award with currently predicted levels of savings; (10) identifying any barriers to the commercialization of SOMO activities which require legislative action to correct; (11) highlighting current regulatory activity within the Office of Commercial Space Transportation; (12) identifying any aspects of commercial space launch which are inhibited by the existence, or lack of, appropriate regulations; (13) specifying required legislative action which would enable such barriers to be removed; and (14) a summary of the manner in which the different office's programs and priorities have changed in response to the Government Performance and Results Act.

Mr. Keith Calhoun-Senghor, Director, Office of Space Commercialization, Technology Administration, Department of Commerce, testified the Office of Space Commercialization conducts activities in four primary areas: (1) policy developments; (2) market analysis; (3) international discussions and export promotion; and (4) outreach and education. Mr. Calhoun-Senghor further testified the Office of Space Commercialization has had a major role in the following achievements in the last year: (1) passage of the Commercial Space Act of 1998; (2) the Administration's decision to add two additional signals to GPS; (3) the establishment of the Remote Sensing Interagency Working Group; and (4) progress towards the development of new proposals to stimulate private sector investment in new space transportation systems. The Office has begun a study of space technologies that are likely to have a significant impact on the commercial market in the coming century. Mr. Calhoun-Senghor reported within the next 10 years, 1,700 satellites will be launched worldwide, and the space industry will experience a growth of at least 20 percent a year, adding as many as 70,000 new high-technology jobs.

Ms. Patti Grace Smith, Associate Administrator, Office of Commercial Space Transportation (OCST), Federal Aviation Administration, Department of Transportation began her testimony by thanking the Committee on Science for passage of the Commercial Space Act of 1998 (P.L. 105–303). Ms. Smith reported the current regulatory activities of the Office of Commercial Space Transportation included: (1) a rule addressing the licensing requirements for launches from federal ranges; (2) a Notice of Proposed Rulemaking (NPRM) regarding licensing requirements for operations of launch sites; and (3) an NPRM for licensing Reusable Launch Vehicles (RLVs) and reentry vehicles. OCST considers extension of the launch indemnification legislation the most desired legislation at this time. Ms. Smith further testified the U.S. launch market now includes 47 percent of the world market. Launch revenues topped $1.1 billion in 1998. The key to the U.S. success has been the high number of commercial launches to Low Earth Orbit (LEO) over the past two years.

Mr. Bruce L. Mahone, Director, Office of Space Policy, Aerospace Industries Association, also testified the U.S. has nearly 50 percent of launches. He noted this percentage did not represent the largest share in actual dollar amounts. Mr. Mahone estimated that with new heavy-lift launch vehicles coming on line in the next few years, the U.S. would gain back much of the heavy lift business and a larger share of the dollar amount of the world market. Several areas of concern included: (1) long-term renewal of the indemnification provisions of the Commercial Space Launch Act; (2) national launch range modernization; and (3) the need for an export arena in which the U.S. industry can export space hardware quickly but maintain U.S. national security.

Mr. Joseph Rothenberg, Associate Administrator, Office of Human Space Flight, National Aeronautics and Space Administration, related his dedication to motivating the Consolidated Space Operations Contract (CSOC) to ensuring NASA takes full advantage of the available commercial communications and operations infrastructure. The Space Office and Management Office (SOMO) was established in 1995 to address the growing cost of NASA's space operations. Mr. Rothenberg reported the solution to cost growth included: (1) the need to downsize the workforce and shift the NASA civil service personnel from operations into R&D; (2) ensure the agency is buying available commercial services in support of operations; (3) take advantage of continued advances in technology to reduce operations costs; and (4) to turn routine space operations over to the contractors. CSOC has had some difficulties with start-up but NASA continues to estimate a savings of $1.4 billion will be realized over the 10 year life of the contract. Mr. Rothenberg concluded his testimony by detailing the responsibilities of the SOMO Board of Directors. The directors consist of representatives from SOMO, Space Science, Earth Science, and Human Space Flight. Their mission is to ensure the needs of the user community are being met by both SOMO and CSOC contractors.

4.4(f)—Range Modernization, Part I

March 24, 1999

Hearing Volume No. 106–10

Background

On March 24, 1999, the Subcommittee on Space and Aeronautics held the first of a series of two hearings on Range Modernization.

Witnesses included: Major General Robert C. Hinson, Director of Operations, Air Force Space Command; Mr. Loren Shriver, Deputy Director for Launch and Payload Operations, NASA's Kennedy Space Center; Mr. Forrest McCartney, Vice President, Launch Operations, Lockheed Martin Astronautics; Mr. Jay Witzling, Vice President and General Manager, Delta II Program, The Boeing Company; and Mr. Ron Grabe, Senior Vice President and Deputy General Manager, Orbital Sciences Corporation's Launch Systems Group.

Summary of hearing

America's obsolete space transportation infrastructure is considered a major factor in lowering the competitiveness of our commercial space transportation industry. It also harms the efficiency and effectiveness of the government agencies which depend on the national launch ranges to carry out scientific or military missions. The goal of this first hearing on Range Modernization was to gather information on the status of the two U.S. national launch ranges and current efforts to improve them.

Witness testimony focused on: (1) Air Force, NASA, and industry perceptions of the national launch ranges, their operations, and current modernization efforts; (2) Air Force, NASA, and industry assessments of what impact this situation will have on achieving their respective space transportation goals; and (3) what role might NASA and industry users play in range modernization.

Major General Hinson, as Director of Operations for Air Force Space Command, is responsible for supplying, training, and equipping the Air Force Wings which operate the Eastern and Western ranges. His testimony stated much of the infrastructure and hardware which make up the ranges are indeed obsolete and/or dilapidated, but he nevertheless believes the Air Force's ongoing, multiphase Range Standardization and Automation (RSA) program is addressing these problems. Maj. Gen. Hinson also stated the Air Force is not suffering any negative impacts on military effectiveness due to launch delays caused by range problems. One key modernization challenge, Maj. Gen. Hinson admitted, is scheduling the repair or replacement of equipment so as not to conflict with increasingly frequent launch campaigns.

Mr. Shriver testified NASA, including both Shuttle and expendable launch vehicle operations, has not yet directly suffered from range-caused scheduling or supportability problems. Nevertheless, NASA is concerned that increased future Shuttle flight rates, particularly during the assembly of the International Space Station, may run up against range limitations that result from the current state of range hardware and software.

Mr. McCartney, a retired Air Force General and former Director of the Kennedy Space Center, leads Lockheed Martin Astronautics' Launch Operations activities, which includes the Athena, Atlas, and Titan vehicles as well as Lockheed Martin's work as the lead contractor for Phase II of the Air Force's RSA modernization program. While Mr. McCartney testified that obsolete equipment at the Eastern Range has already caused launch delays for Lockheed Martin and its customers, he believes the current RSA effort, if fully funded, should solve the majority of problems by the completion date of 2007.

Mr. Witzling, as manager of Boeing's Delta II program, testified as part of its participation in the EELV program, Boeing is spending several hundred million dollars on new launch infrastructure at the Delta IV launch sites at Cape Canaveral and Vandenberg Air Force Base. Because they are investing in these, Boeing does not believe private launch users should pay substantially more than the current "marginal costs" for range usage. Nevertheless, Boeing estimates even if the RSA program is fully implemented, its 2007 completion date will be four years too late for a predicted launch frequency "peak" in 2003.

Mr. Grabe, speaking about Orbital Sciences' Pegasus and Taurus small-payload launch systems, indicated the Air Force's flat rate costs for range services disproportionately hurt their international competitiveness. He also amplified other industry witnesses' criticism of how the Air Force operates the ranges in a non-businesslike manner. Finally, Mr. Grabe pointed out that in the near future, reusable launch vehicles will require new approaches to space transportation infrastructure to account for landings, including non-destruct flight termination.

4.4(g)—U.S. Commercial Space Launch Competitiveness, Part I

April 21, 1999

Hearing Volume No. 106–13

Background

On April 21, 1999, the Subcommittee on Space and Aeronautics held a hearing titled "Extension of Space Launch Indemnification."

Witnesses included: the Honorable Tidal W. McCoy, Chairman of the Space Transportation Association; Ms. Patricia A. Mahoney, Chair of the Satellite Industry Association; Ms. Esta Rosenberg, Attorney Advisor for the Federal Aviation Administration's Office of the Chief Counsel; and Mr. Joel Greenberg, President of Princeton Synergetics.

Summary of hearing

With the current government indemnification of space launches set to expire December 31, 1999, the launch industry has been pressing Congress for an extension of this financial protection. This hearing gave Subcommittee members an opportunity to examine this issue in preparation for upcoming legislation on this topic.

Witness testimony focused on: (1) a brief synopsis of the Space Transportation Association (STA) and its member companies; (2) STA's recommendations on whether to extend launch indemnifica-

tion; (3) the implications of a 1-year extension followed by a 5-year extension with additional commercial incentives versus a straight 5-year extension; (4) how Reusable Launch Vehicle (RLV) development activities would be impacted by indemnification renewal; (5) a brief synopsis of the Satellite Industry Association (SIA) and its member companies; (6) SIA's recommendations on whether to extend launch indemnification; (7) how commercial satellite marketing efforts are impacted by uncertainties in indemnification extension; (8) the Federal Aviation Administration's role in the regulation of commercial launch activities; (9) how indemnification fits into the FAA's "Financial Responsibility and Risk Allocation" activities as described in the Commercial Space Launch Act; (10) answers to specific questions from the Members of the Subcommittee on indemnification, including from a legal or regulatory standpoint; (11) Princeton Synergetics' study on indemnification extension for the Federal Aviation Administration's Office of Commercial Space Transportation; (12) Princeton Synergetics' recommendations on whether to extend launch indemnification; (13) recommendations for future launch environments with respect to insurance indemnity; and (14) any recommended actions to facilitate such a restructured scenario.

The Honorable Tidal W. McCoy, Chairman of the Space Transportation Association began his testimony with an overview of the Space Transportation Association. The organization, founded by General Daniel O. Graham, brings together aerospace companies for the purpose of developing and advocating standards, producing studies and analyses that address specific matters related to space transportation, and maintaining close contact with key figures in the Executive and Legislative branches of government. Mr. McCoy then characterized the U.S. Government's extension of commercial launch indemnification as the single most important thing that can be done to assist the commercial launch market. He further indicated that, after consulting with his member companies, he could report this extension would be necessary to assist both large and small companies which build both expendable and reusable vehicles. Moreover, this extension would need to be for a sufficient period of time—at least 5 years—in order to demonstrate to customers and investors a stable and favorable U.S. launch business environment.

Ms. Patricia A. Mahoney, Chair of the Satellite Industry Association, first presented an overview of her organization—consisting of over 30 member companies involved in all aspects of aerospace. She explained the Satellite Industry Association's purpose is to represent the wide gamut of industry with one voice and message. Ms. Mahoney then described the commercial space market itself, pointing out that the U.S. manufactures over two-thirds of the world's satellites, the U.S. accounted for slightly less than half of the world's commercial space revenues, and the number of commercial launches now exceed government launches—including both military and civilian. Further testimony described the criticality of indemnification extension, pointing out this policy has never cost the government anything, a long-term extension would be necessary to ensure stable markets, and such extension was a critical factor in the consideration of international competition.

Ms. Esta Rosenberg, Attorney Advisor for the Federal Aviation Administration's Office of the Chief Counsel, described the regulatory responsibility of her office. As she pointed out, her office's first responsibility is to ensure the safety of the public and to safeguard U.S. interests. Indemnification extension, she described, is consistent with both of these goals. The government's provision for indemnification protection is the result of a quid pro quo agreement where the commercial launch company agrees to purchase liability insurance up to the maximum probable loss amount. Indemnification is then provided for up to $1.5 billion worth of third-party liability beyond that insured amount. Accordingly, Ms. Rosenberg indicated her office's strong endorsement of indemnification extension in order to ensure this continued agreement which helps the launch companies and protects the public.

Mr. Joel Greenberg, President of Princeton Synergetics, began his testimony with an overview description of the indemnification issue and the space launch insurance sector. He then recommended against the short-term elimination of indemnification protection, citing the dramatic shock to launch service providers, customers, insurers, and investors. However, Mr. Greenberg also described a possible long-term view on indemnification which might provide for a different relationship between industry and government with regard to risk sharing. Accordingly, he recommended the immediate extension of indemnification, but with a simultaneous look at ways to gradually phase this protection out in favor of a restructured approach.

4.4(h)—Y2K in Orbit: The Impact on Satellites and the Global Positioning System

May 12, 1999

Hearing Volume No. 106–6

Background

With just over 200 days remaining untill the date rollover, this hearing received a status report on the Y2K impact on our Nation's satellite systems and the Global Positioning System (GPS) from representatives of the National Aeronautics and Space Administration (NASA), the Department of Defense (DoD), the General Accounting Office (GAO), and an industry trade association. Satellite networks are a critical link to communications worldwide, from cellular phones to weapons guidance and aircraft navigation. Yet, the computers running those networks could be Y2K vulnerable since those networks rely on computers that are controlled by thousands of software programs and millions of lines of programming code.

Witnesses included: Mr. Lee B. Holcomb, Chief Information Officer, National Aeronautics and Space Administration; Dr. Marvin Langston, Deputy Chief Information Officer, U.S. Department of Defense; Mr. Neil R. Helm, Member, Communications Systems Technical Committee, American Institute of Aeronautics and Astronautics; and Mr. Keith Rhodes, Technical Director for Computers and Telecommunications, United States General Accounting Office.

Summary of hearing

Mr. Rhodes stated the Global Positioning System (GPS) is the Department of Defense's primary radionavigation system, and the GPS has become an integral asset in numerous civilian applications and industries, including emergency services, airlines services, commercial fishing and shipping, corporate vehicle fleet tracking, and surveying. It also plays a critical role in communications networks and, hence, the Internet. The system is affected by both the Year 2000 computing problem and a problem associated with the way the system keeps track of time. Mr. Rhodes believes it is vital that organizations make an effort to determine (1) whether the networks they operate rely on GPS equipment as a time source and (2) the potential GPS-related risks. Once the problem and its potential impact are known, organizations and individual users can (1) modify receivers, (2) replace them with newer models, or (3) contact their service providers to ensure that GPS receivers supporting their telecommunications networks are not susceptible to the upcoming End-of-Week rollover. Because the rollover is less than 4 months away, however, organizations must undertake these measures as quickly as possible.

Dr. Langston stated that the DoD has the largest and most comprehensive evaluation plan in the Department's history, and is continuing to work on refining plans to improve the overall evaluation of core DoD functions. This plan will significantly improve the level of confidence in the DoD's ability to carry on operations despite Year 2000. While these extensive efforts will mitigate risk, the interconnectedness of everything guarantees that Year 2000 will have an impact on DoD. To deal with this reality, DoD must focus on realistic contingency planning. Dr. Langston said the Department of Defense will be prepared to execute its national security responsibilities before, on, and after January 1, 2000. The Department's comprehensive systems compliance efforts, operational evaluations and end-to-end testing, and systems and operational contingency plans are being developed and executed within a solid management structure. All Year 2000 efforts are receiving the personal attention of the Department's senior leadership. Finally, these efforts are being rigorously scrutinized by independent auditors, including the Department's Inspectors General and the General Accounting Office.

Mr. Holcomb stated the GPS is a technical problem similar to but not directly related to Y2K. Two upcoming events may affect civil GPS users and government users of commercially procured receivers—GPS End of Week rollover and Y2K issues. GPS End-of-Week rollover happens every 20 years because GPS system time, counted in weeks, started counting on January 6, 1980. At midnight between August 21 and 22, 1999 the GPS week will rollover from week 1023 to 0000. This could be interpreted as an invalid date in GPS receivers that were not designed to meet GPS specification. The Department of Defense is the service provider for GPS and has verified that all generations of GPS satellites and ground support systems are Y2K and End-of-Week rollover compliant. NASA has assessed the impact of this known problem with GPS receivers, and has replaced or upgraded a small number of GPS receivers where required, either for this GPS-unique problem, or due

to Y2K reasons. Mr. Holcomb said NASA does not anticipate problems with GPS receivers on August 21, 1999 or on January 1, 2000. Additionally, NASA remains confident the probability of a Y2K-related failure of NASA-controlled assets and systems is very low.

Mr. Helm stated the Y2K problem has been examined by the U.S. commercial satellite communications vendors and service providers. The results of the examination indicate because spacecraft on board timing clocks are not referenced to calendar dates, there will be no space segment anomalies with the Year 2000 rollover. However, problems will be found in early designs of ground-segment equipment, both in the hardware and software. The major companies are currently addressing these problems with a rigorous compliance program, and are informing their customers if and when modifications need to be made.

4.4(i)—U.S. Commercial Space Launch Competitiveness, Part II

June 10, 1999

Hearing Volume No. 106–13

Background

On June 10, 1999, the Subcommittee on Space and Aeronautics held a hearing titled "Barriers to Commercial Space Launch."

Witnesses included: Mr. Edward A. O'Connor, Jr., Executive Director, Spaceport Florida Authority; The Honorable Andrea Seastrand, Executive Director, California Space and Technology Alliance; Mr. Bruce L. Mahone, Director, Space Policy, Aerospace Industries Association; Dr. Jerry Grey, Director, Aerospace and Science Policy, American Institute of Aeronautics and Astronautics; and Ms. Laura Montgomery, Attorney-Advisor, Federal Aviation Administration's Office of the Chief Counsel.

Summary of hearing

A number of significant policy issues face the commercial launch industry which may require legislation. The potential need for such legislation provides the Congress with a unique opportunity to examine the framework of the commercial launch industry as a whole. This hearing gave Subcommittee members an opportunity to identify and examine barriers that impede such commercial launch activities in anticipation of upcoming legislation on the topic.

Witness testimony focused on: (1) the identification of problems and challenges which create barriers to the commercial space launch industry; (2) descriptions of corrective actions necessary to correct such barriers; (3) descriptions of any other appropriate changes in program funding, policy, legislation, or international agreements to help the commercial space launch sector; (4) the government perspective on problems and challenges which create barriers to the commercial space launch industry; and (5) a discussion of current regulatory activity at the FAA Office of Commercial Space Transportation which will address such barriers.

Mr. Edward A. O'Connor, Jr. began his testimony with an overview of the Spaceport Florida Authority—a component of the Florida State Government. The Spaceport coordinates key partnerships between state government, Federal Government, and the private

sector to promote and enable the commercial launch industry. Mr. O'Connor described a series of meetings held with the private sector to identify key issues. He identified the extension of launch indemnification as the most critical issue facing the U.S. launch community. He further describes the critical importance of modernizing the launch range facilities. During those meetings, a total of 18 barriers to commercial launch were identified, of which 7 were recognized as critical, 4 were deemed to be important, and the remaining 7 were deleted from further discussion. Mr. O'Connor described a brief overview of the "critical" and "important" issues, and further stressed the importance of preserving U.S. launch capability in light of the Cox-Dicks Committee Report.

The Honorable Andrea Seastrand also began her testimony with an overview of the California Space & Technology Alliance—also designated as the California Spaceport Authority. This organization functions as the official policy advisor to both the California Governor and State Legislature. The spaceport also represents the State of California's interests in dealing with both the federal and local governments. Ms. Seastrand's description of commercial launch barriers echoed those of Mr. O'Connor—a reasonable outcome since the California Spaceport worked with many of the same stakeholders as the Florida Spaceport. She also addressed the national security concerns described in the Cox-Dicks Committee Report, and stressed the importance of finding an important balance between the two legitimate concerns of U.S. national security and international competitiveness in the aerospace industry.

Mr. Bruce L. Mahone's testimony reflected the viewpoint of U.S. manufacturers. His testimony identified broader issues to set the stage for overall U.S. competitiveness in the coming years. He first described the importance of a careful consideration of bilateral launch trade agreements with Russia, China, and the Ukraine. He then indicated the importance of reinstating the White House National Space Council (a sentiment echoed by the written testimonies of Ms. Seastrand and Mr. O'Connor). He further stressed the importance of the preservation of radio spectrum allocation for the commercial sector, particularly in light of recent jurisdictional transfers of this matter. Finally, Mr. Mahone spent the balance of his testimony describing the importance of the national investment in research and development. He pointed out that current levels are at an all-time low relative to Gross Domestic Product reinvested in aerospace research. He further testified that the trade surplus is larger in aerospace than any other U.S. industrial sector, and a healthy R&D base will help to preserve the international market share.

Dr. Jerry Grey began his testimony with a description of his policy background and his specific support to the American Institute of Aeronautics and Astronautics. He then identified 10 specific initiatives which, if implemented, would help lower existing barriers to the commercial launch sector. Dr. Grey grouped these suggestions into 4 categories: (1) U.S. Government policy and/or policy implementation, (2) industry actions, (3) joint government/industry actions, and (4) government incentives for industry. Dr. Grey described his ideas and expanded on suggestions for their implementation.

Finally, Ms. Laura Montgomery represented the government's perspective addressing commercial launch barriers. Specifically, from the FAA's point of view, the two topics meriting particular attention were (1) the extension of commercial launch indemnification, and (2) the continuation of the FAA Office of Commercial Space Transportation's progress in updating their regulatory program. Ms. Montgomery expressed appreciation that the Subcommittee's earlier hearing had focused on the first topic, and therefore focused her testimony on the second. Specifically, she described regulatory progress underway at the FAA and gave a status report of several specific measures. She further described the FAA's engagement of the industry via the Commercial Space Transportation Advisory Committee. Finally, Ms. Montgomery detailed the FAA's efforts to develop a comprehensive air and space traffic management system. She described the recently released "Concept of Operations in the National Airspace System in 2005" which defines those efforts, and submitted the report for the record.

4.4(j)—Range Modernization, Part II

June 29, 1999

Hearing Volume No. 106–10

Background

On June 29, 1999, the Subcommittee on Space and Aeronautics held a joint hearing with the House Committee on Armed Services' Subcommittees on Military Research and Development and Military Procurement.

Witnesses included: Lt. Gen. Richard Henry, USAF (Ret.), chaired a Range Integrated Product Team study for Air Force Space Command; Dr. John M. Borky, Vice Chairman, Air Force's Scientific Advisory Board; Mr. Tom Moser, Executive Director, Texas Aerospace Commission; Mr. Robert Davis, President, R.V. Davis & Associates; and Mr. Jess Sponable, Vice President for Flight Operations, Universal Space Lines.

Summary of hearing

This hearing built on the record of the Subcommittee on Space and Aeronautics' previous fact-finding hearing ("Range Modernization, Part I" on March 24, 1999) by addressing various options for improving the condition and operation of U.S. federal launch ranges. Several independent but knowledgeable witnesses were able to discuss a wide range of different approaches to solving current and possibly-worsening problems at the ranges, both to meet near-term public and private demands and to enable long-term space transportation competitiveness.

Witness testimony focused on: (1) the effectiveness of the Federal Government's current approach to management and funding of range operations and modernization, particularly for current and planned commercial space transportation systems; (2) the impact of current and potential federal investments in range modernization on non-federal space launch facilities and the role such facilities could play in addressing the inadequacies of the U.S. launch infrastructure; (3) the emergence of reusable launch vehicles and their

impact on space transportation infrastructure development and operation; and (4) potential alternative approaches to management and funding of range operations and modernization.

Lt. Gen. Henry (USAF, Ret.) presented a summary of the recommendations of the Range Integrated Product Team he led for Air Force Space Command. These included moving the federal ranges towards an "airport operations" model; improving range management—including accounting and business practices—to become more "customer friendly;" an independent assessment of whether new technologies can ease the cost burden of providing range safety; and increasing funding to pay for a "second shift" of workers, enabling faster progress in modernization without negatively impacting launch schedules. He also noted that a budget-constrained Air Force will always fund military obligations (such as foreign deployments) before investing in range infrastructure to meet commercially-driven needs. Finally, Lt. Gen. Henry stated industry might be willing to bear a greater fraction of the financial costs of range operations (and modernization) in exchange for priority launch scheduling and a more business-friendly approach in operating the range.

Dr. Borky testified about the Air Force Scientific Advisory Board's "Space Roadmap for the 21st Century Aerospace Force" study and its recommendation to "transition national launch facilities to civilian operations with the Air Force as a tenant." Dr. Borky echoed Lt. Gen. Henry's comments on the inappropriateness of the Air Force having to subsidize an increasingly-commercial activity. He stated an initial step towards "privatization" of the ranges would be to combine the operations and modernization contracts at the federal ranges into one integrated effort. This would allow for greater efficiencies, with savings plowed back into modernization investments. Beyond this first step, Dr. Borky suggested appropriate federal, state, and commercial entities should plan out a transfer of responsibility for the ranges to one or more national or regional spaceport authorities.

Mr. Moser testified on the Texas Aerospace Commission's plans to develop a "spaceport" in southern Texas to support the operations of one or more commercial reusable launch vehicle companies. He stated reusable launch vehicles will require a new kind of space transportation infrastructure different from the federal ranges which is designed from the ground up for efficient operations, much like (and possibly integrated with) an airport. These spaceports should be developed—like most other transportation infrastructure—as a partnership between the public and private sectors. Mr. Moser argued that simply increasing Air Force spending on existing ranges is not sufficient to boost U.S. space transportation, and recommended that the Federal Government "balance" its investment in current ranges with support for commercial spaceports.

Mr. Davis, a former Deputy Undersecretary of Defense for Space, testified that based on discussions with several senior Air Force officials he believes they no longer see space launch infrastructure as a critical "role and mission" for the Air Force. While the Air Force should continue its current range modernization program, Mr. Davis argued Congress, the Executive Branch, and Industry should

all work to define a new approach which would reflect the growing commercialization and internationalization of space transportation activities. One option would be to turn the ranges into "government-owned, contractor-operated" facilities, where the Air Force (or another federal agency) would perform a few limited functions and everything else would be managed by a commercial operator. Another, Mr. Davis stated, was to "privatize" the ranges by selling them to one or more companies which would operate them under the regulation of a government oversight board.

4.4(k)—H.R. 1883, Iran Nonproliferation Act of 1999

July 13, 1999

Hearing Volume No. 106–22

Background

On July 13, 1999 the Subcommittee on Space and Aeronautics held a hearing entitled, "H.R. 1883, Iran Nonproliferation Act of 1999," to review the legislation, which had been referred to the Committee for consideration.

Witnesses included: Mr. Kenneth Timmerman, Director, Middle East Data Project, editor of The Iran Brief, and a contributing editor to Reader's Digest; Mr. Henry Sokolski, Executive Director, Nonproliferation Policy Education Center and former Deputy for Nonproliferation Policy in the Office of the Secretary of Defense during the Bush Administration; Mr. Roald Sagdeev, Executive Director, East-West Center, University of Maryland; and, Mr. John Schumacher, NASA's Associate Administrator, Office of External Relations.

Summary of hearing

The hearing was called to review H.R. 1883, the Iran Nonproliferation Act of 1999, and the connection between U.S. nonproliferation policies and Russian proliferation activities. Specifically, the Iran Nonproliferation Act of 1999 prohibits the National Aeronautics and Space Administration from transferring U.S. funds to the Russian Space Agency (RSA) and entities under RSA's jurisdiction unless the President determines: (1) the Russian government opposes proliferation to Iran; (2) the Russian government is taking steps to halt the transfer of Russian technology associated with weapons of mass destruction and ballistic missiles to Iran; and (3) the Russian Space Agency and entities under its jurisdiction have not transferred such technology to Iran during the year prior to the President's determination. The hearing gave Members the opportunity to review Russian proliferation activities, U.S. nonproliferation options, and the potential impact of the legislation on the International Space Station prior to the Committee's consideration of the bill.

Mr. Timmerman testified about the extent of Russian-Iranian cooperation in Iran's efforts to develop ballistic missiles and weapons of mass destruction. He began by noting the Russian government had approved visas to allow Russian scientists and engineers to train Iranian scientists and engineers in a variety of weapons-related fields both in Russia and Iran. He further summarized past

instances in which the Bush and Clinton Administrations had sanctioned Russian state-owned research enterprises for assisting Iran's efforts to develop ballistic missiles and weapons of mass destruction. He concluded by pointing out that public sources indicated some 20 Russian entities were committing Category I and II violations of the Missile Technology Control Regime (MTCR) and the Russian Space Agency (RSA) was responsible for these entities under Russian law. Mr. Timmerman argued against watering down H.R 1883 in any way.

Mr. Sokolski testified passage of H.R. 1883 was critical to U.S. efforts to stem the proliferation of ballistic missiles and weapons of mass destruction to Iran. He stated making payments to the Russian Space Agency while it was assisting Iran's efforts to acquire such weapons would only create contempt for U.S. nonproliferation norms and stated the bill was well-crafted to use the leverage the United States had over RSA, which is responsible for the Russian aerospace industry under Russian law, to encourage it to more aggressively ensure Russian compliance with the MTCR. Mr. Sokolski argued in favor of toughening H.R. 1883 if that was possible.

Mr. Schumacher testified Russia was an important partner in the International Space Station program. He stated nonproliferation was a top priority for the Clinton Administration and the Russians had made progress "on the nonproliferation front" by adopting new policies. He further testified NASA opposed section 6 of H.R. 1883, which precludes U.S. payments to the Russian Space Agency if Russia is assisting Iran's efforts to acquire or develop ballistic missiles and weapons of mass destruction, because raising the International Space Station in the nonproliferation context would make the United States appear an unreliable partner and might lead Russia to reduce its contributions to ISS. Mr. Schumacher did not address the point that Russian participation in the ISS was initially justified by the Administration in order to incite Russian compliance with the MTCR.

Mr. Sagdeev testified that Russian press reports Russia's aerospace executives were enriching themselves by assisting Iran's missile programs were unreliable. He continued by stating Russia was so chaotic that the Russian government could not stem the flow of technology from its borders and the funds NASA was planning to pay the Russian Space Agency (approximately $100 million) were inconsequential as a source of revenue to the Russian aerospace industry.

4.4(l)—Space Shuttle Safety

September 23, 1999

Hearing Volume No. 106–36

Background

On September 23, 1999, the Subcommittee on Space and Aeronautics held a hearing entitled, "Space Shuttle Safety."

Witnesses included: Mr. Michael J. McCulley, Vice President and Deputy Program Manager, United Space Alliance; Mr. William F. Readdy, NASA's Deputy Associate Administrator for Space Flight;

and Mr. Frederick D. Gregory, NASA's Associate Administrator for Safety and Mission Assurance.

Summary of hearing

On July 23, 1999 at 12:30 a.m. the Space Shuttle *Columbia* launched from NASA's Kennedy Space Center on mission STS–93 to deploy the Chandra X-ray Observatory telescope. This mission received much publicity due to its commander, Air Force Colonel Eileen Collins—the first female commander of the Space Shuttle. This flight, however, was also unusual because of several significant anomalies that occurred during the launch phase of the flight. This hearing gave Subcommittee Members an opportunity to learn more about the problems that occurred during the flight and the subsequent response by NASA and the United Space Alliance. Testimony also addressed procedures under consideration for change as a result of the issues identified in the post-flight review and inspections of STS–93.

Witness testimony focused on: (1) an overview of Shuttle inspection and repair activities underway; (2) the expected completion date for these activities; (3) changes in procedure to be considered in light of discoveries made during inspection of the orbiters; (4) a description of any damage and resulting program impacts due to Hurricane Floyd; (5) a brief overview of anomalies encountered during the STS–93 flight; (6) resultant corrective action planned as a result of those anomalies; (7) the current state of the Shuttle launch schedule after considering the hurricane evacuation, the inspection and repair activities, and the Leonids Micrometeroid Shower; (8) an overview of the panel led by Harry McDonald which is comparing best practices within the aviation and space communities; (9) the extent to which the NASA Associate Administrator for Safety and Mission Assurance is participating in the Shuttle inspection and repair activities underway; (10) the extent to which his office had participated in developing previously instituted procedures as they relate to the problems now being found; (11) the extent to which he was aware of the problems encountered with LOX post deactivation pin ejections during testing and what corrective actions were taken after those tests; and (12) his office's assessment of whether the combination of main engine shutdown and the resultant loss of fuel line pressure with the ruptured hydrogen tubes exposed to flame could have resulted in catastrophic loss of the orbiter.

Mr. Michael J. McCulley, Vice President and Deputy Program Manager at the United Space Alliance (USA), began his testimony with a brief description of his company's role in the operation of the Space Shuttle. He then described, in a greater level of detail, specific anomalies encountered during the STS–93 flight, and the wiring inspection procedures underway. Further testimony addressed the impacts from these problems on both the Shuttle program generically and USA's role in the program specifically. Throughout his testimony, Mr. McCulley emphasized USA's commitment to ensuring that Shuttle safety remain the number one priority, and that safety considerations take precedence over concerns about Shuttle scheduling, cost, performance, and USA corporate financial considerations.

Mr. William F. Readdy, NASA's Deputy Associate Administrator for Space Flight, began his testimony with a summary of Space Shuttle program priorities, to (1) Fly Safely; (2) Meet the Manifest; and (3) Improve Mission Supportability. Further testimony described anomalies encountered during the STS–93 flight, and the post-landing resolution activities. Mr. Readdy pointed out the new Shuttle launch schedule could not be addressed until the full aftereffects of Hurricane Floyd had been determined. Mr. Readdy then described the independent assessment team in place to compare Shuttle practices with those of commercial aviation, and finally underscored NASA's commitment to Shuttle safety.

Mr. Frederick D. Gregory, NASA's Associate Administrator for Safety and Mission Assurance, began his testimony with an overview of his office for Safety and Mission Assurance, and that office's role both within NASA and within the Shuttle program. Further testimony described his office's specific role in Space Shuttle inspection and repair activities underway, and the post-flight analysis of problems encountered during previous tests and the STS–93 flight. In this testimony, Mr. Gregory pointed out, while his office was not directly responsible for carrying out the safety activities addressed in the hearing, his office did concur with the safety-related actions carried out by the Shuttle program office.

4.4(m)—NASA's X–33 Program

September 29, 1999

Hearing Volume No. 106–41

Background

On September 29, 1999, the Subcommittee on Space & Aeronautics held a hearing entitled, "NASA's X–33 Program."

Witnesses included: Mr. Gary Payton, NASA's Deputy Associate Administrator for Aero-Space Technology (Space Transportation Technology); Mr. Jerry Rising, President and CEO, VentureStar, LCC; and Mr. Allen Li, Associate Director for Defense Acquisition Issues, U.S. General Accounting Office.

Summary of hearing

The NASA-Lockheed Martin X–33 project has been the centerpiece of the space agency's efforts to develop and demonstrate advanced space transportation technologies since 1996. Led by an industry team working in partnership with NASA, the X–33 effort aims to enable private industry to develop and operate fully-reusable launch vehicles (such as Lockheed Martin's proposed VentureStar) that could dramatically lower the cost of human and cargo space transportation. But according to an August 1999, General Accounting Office report and previous hearing testimony, the project has met with significant technical problems causing a schedule slip of nearly a year and a half, significant cost increases (mostly borne by industry), and some reduction in "technology content."

Witness testimony focused on: (1) the current cost and schedule projections for completion of the X–33 program; (2) changes in the technical and programmatic objectives of the X–33 program; (3) the

impact of the X–33's problems on other NASA programs and budgets; and (4) "lessons learned" emerging from the X–33 program to date.

Mr. Payton began by pointing out the X–33 program has been the first serious effort to develop new space transportation technology since the Space Shuttle was initiated in the early 1970s. While the project has suffered delays, it has already succeeded in pushing several advanced technologies that will enable many potential reusable launch vehicles. Given a limited budget and the time constraint of the "End of Decade Decision" (in the President's Space Transportation Policy), NASA believed a single X–33 vehicle was the best way to proceed. Since then, NASA has gone on to initiate additional X-vehicle projects to pursue alternative technologies to enable competing reusable launch systems.

Mr. Rising testified the X–33 program has been able to capitalize on technological progress to demonstrate both performance and operational capabilities that would enable a single-stage-to-orbit launch system. While some performance standards for the X–33 flight test program have been reduced, the X–33 will still fully demonstrate the key technologies required for a low-cost, fast-turnaround reusable launch vehicle. Additional costs incurred due to technical difficulties and related schedule delays have been borne by Lockheed Martin, using both corporate funds and Independent Research and Development (IR&D) monies (earned in other government contracts). Both the successes have been achieved so far with the X–33 and the project's responsiveness to the technical challenges are largely due to the unique industry-government partnership pioneered by the X–33 project.

Mr. Allen Li testified on the major conclusions of the General Accounting Office's investigation of the X–33 program, and began by noting the project has already failed to meet some of its original cost, schedule, and performance objectives. Because Lockheed Martin will use government-paid IR&D funds to cover some of its additional expenses, the government will share some burden of these cost overruns, although NASA will not pay for them directly. The cooperative agreement used to manage the NASA-Lockheed partnership on the X–33 has worked well, giving government greater access to information on how the company is doing. Mr. Li added that while X–33 may help enable a commercial VentureStar reusable launch vehicle that can lower NASA's launch costs, there are many other obstacles which must be resolved before that happens. Furthermore, NASA does not have a clear roadmap of how it will build in the X–33 project's results to achieve lower-cost access to space, particularly for crew and cargo missions to the International Space Station.

4.4(n)—Commercial Spaceplanes

October 13, 1999

Hearing Volume No. 106–41

Background

On October 13, 1999, the Subcommittee on Space & Aeronautics held a hearing entitled, "Commercial Spaceplanes."

Witnesses included: Dr. George Mueller, President and Chief Executive Officer, Kistler Aerospace Corporation; Mr. Steve Wurst, President and CEO, Space Access, LLC; Mr. Gary Hudson, President and CEO, Rotary Rocket Company; Mr. Mitchell Burnside Clapp, Chief Executive Officer, Pioneer Rocketplane; and Mr. Robert Davis, President and CEO, Kelly Space & Technology, Inc.

Summary of hearing

Over the same period as NASA has begun pursuing RLV technologies (1993-present), several U.S. entrepreneurs started private companies to develop commercial reusable launch vehicles (RLVs). They had been inspired by the early and public success of the first federal experimental RLV, the Defense Department's DC–X; by the forecasts of several commercial Low Earth Orbit-based communications satellite (LEOsat) constellations (requiring low-cost replenishment) which would require multiple launches; and by many policymakers' interest in promoting cheaper access to space and commercial space development. This hearing assessed the progress made and challenges faced by this new "spaceplane" industry in the context of several public policy goals: lowering launch costs to promote the commercialization of space and reduce NASA's human and cargo space transportation expenses, improving the U.S. launch industry's capacity and competitiveness, and pursuing synergy with military RLV technology investments.

Written testimony focused on: (1) the companies' commercial RLV concepts, proposed capabilities and intended markets; (2) the status of their RLV development efforts; (3) the impact that changes in the satellite launch marketplace and/or government actions have had on their progress; (4) their RLV concept's applicability toward the Nation's goals in civil, military, and commercial space, including meeting NASA's space transportation requirements; and (5) the assistance they would like from the Federal Government in order to help them succeed in developing their commercial RLV systems.

George Mueller stated Kistler has completed some 75% of the manufacturing work on its first K–1 RLV, having raised and spent over $500 million in private funding to date. To help companies like Kistler complete development of their systems, Dr. Mueller recommended that the Federal Government use contingent launch service contracts, tax incentives (such as capital gains "holidays"), and procurement reforms. Commercial RLVs, in turn, would allow the government not only to save money on launch costs but increase safety, reliability, and flexibility for human and cargo space missions.

Steve Wurst testified unlike other commercial RLV companies, Space Access is targeting the medium-heavy payload market, including geosynchronous (GEO) communications satellites. Space Access' SA–1 vehicle is designed to be more like an airplane than a high-performance launch vehicle, using weight-efficient air breathing engines in its first stage and a robust and simplified physical structure. In addition to launching commercial satellites, the SA–1 could carry logistics modules or a crewed vehicle to the International Space Station. Continued government funding of existing or incrementally improved launch systems, however, dis-

suades commercial investors from investing in new systems such as the SA–1, Mr. Wurst argued. Government financial incentives, especially loan guarantees, would invigorate the private RLV industry. Finally, government could encourage commercial investment if it allowed companies to retain their intellectual property even when they receive some federal assistance.

Gary Hudson presented a video of an October 12, 1999, test flight of Rotary Rocket's Atmospheric Test Vehicle, a full-scale prototype of the planned Roton RLV. Mr. Hudson stated government action to help the commercial RLV industry should be carefully planned so as to do no harm, and should focus on providing incentives to private investors. These could include tax credits with a pass-through to passive investors, and loan guarantee legislation which does not pick winners and losers. Both NASA and the Federal Aviation Administration should expand their efforts to support the RLV industry. Finally, current export control problems are hampering development of new RLVs as well as their eventual commercial operation.

Mitchell Burnside Clapp testified Pioneer Rocketplane's approach in developing its Pathfinder RLV is to minimize as much risk as possible, and therefore uses not only off-the-shelf technologies but also off-the-shelf parts. Nevertheless, Pioneer's progress has been slowed by competition from subsidized systems, an unstable market for small satellite launches, and a general lack of interest in launch vehicle development projects among institutional investors. NASA could help by providing in-kind services, including expertise and access to unique facilities such as windtunnels, in exchange for launch service options. Mr. Clapp concluded by stating Pioneer could meet many of the government's required space transportation needs, and could do so sooner if the economic development practices of Earth were applied to space.

Robert M. Davis testified Kelly Space & Technology's Astroliner uses a unique tow-launch approach, and therefore is free from many of the ground infrastructure requirements of existing launch vehicles. Like other companies, Kelly faces difficulty in raising private funds because of foreign as well as domestic government competition, a decline in demand for small satellite launches, and the current Internet investment "mania." The government could help companies like Kelly by funding flight demonstrations of RLV concepts, by tailoring its future payloads to use—rather than preclude—commercial RLVs, and by offering appropriate investment incentives.

4.4(o)—Safety and Performance Upgrades to NASA's Space Shuttle

October 21, 1999

Hearing Volume No. 106–41

Background

On October 21, 1999, the Subcommittee on Space and Aeronautics held a hearing entitled, "Safety and Performance Upgrades to NASA's Space Shuttle."

Witnesses included: Mr. William F. Readdy, NASA's Deputy Associate Administrator for Space Flight; Mr. Andy Allen, Director of

Space Shuttle Development, United Space Alliance; Mr. Byron K. Wood, Vice President and General Manager, Boeing Rocketdyne Propulsion and Power; and Dr. Stephen A. Book, a member of the National Research Council's Committee on Shuttle Upgrades.

Summary of hearing

NASA currently has numerous plans both underway and planned in the future to upgrade the Space Shuttle. NASA intends to upgrade the Shuttle in order to: (1) enhance safety and reliability; and (2) improve performance. Accordingly, this hearing will give Subcommittee members an opportunity to learn about the various types of upgrades under consideration in preparation for any funding requests that NASA might present to Congress for these activities.

Witness testimony focused on: (1) any recommendations toward further privatization of the Space Shuttle that would enhance the efficiency or effectiveness of United Space Alliance's Shuttle upgrade activities; (2) an overview of the Space Shuttle Main Engine (SSME); (3) an overview of the factors which have led to the requirement to upgrade the SSME; (4) an overview of the SSME upgrade program in place including the completion of the Block II design in 2000; (5) an overview of the need or desire for any additional future engine upgrades to be performed subsequent to the Block II design; (6) an overview of the NASA framework under which upgrades to the Shuttle are defined and prioritized; (7) a description of safety upgrades which have already been incorporated into the Shuttle; (8) a description of planned or desired safety upgrades, the timeframe for these upgrades, and the associated costs; (9) desired performance upgrades, the timeframe for these upgrades, and the anticipated costs; (10) the findings of the National Research Council Committee on Space Shuttle Upgrades; (11) followup activities subsequent to the Committee's recommendations (i.e. NASA's response and resulting actions); and (12) the methodology used by the study team to distinguish between safety and performance-driven upgrades.

Mr. William F. Readdy, NASA's Deputy Associate Administrator for Space Flight, began his testimony with an overview of the Shuttle Upgrades Program and a description of the upgrades selection process. The selection of upgrades, as he described, is conducted by a separate review board which makes recommendations to the program office for final approval. As Mr. Readdy pointed out, an important third category of upgrade not identified by the Subcommittee—supportability upgrades—seeks to improve the Shuttle's efficiency of operations, even though it might not directly impact safety or performance. Finally, Mr. Readdy provided a detailed list of upgrades planned or under consideration by NASA which will provide the Subcommittee with useful context for the oversight of future upgrades planned.

Mr. Andy Allen, Director of Space Shuttle Development at United Space Alliance (USA), began his testimony with a description of improved Shuttle operations under USA's stewardship. He then transitioned into a discussion of Shuttle upgrades in that context, describing investments and activities undertaken by USA independent of NASA upgrade activities, providing cost savings

both to USA and NASA. Mr. Allen then detailed specific upgrades in progress, and underscored Mr. Readdy's designation of supportability upgrades as a distinct class of activities. The discussion of additional privatization did not identify ground-breaking new areas for consideration, but rather underscored the importance of continuing this trend.

Mr. Byron K. Wood, Vice President and General Manager of Boeing Rocketdyne Propulsion and Power, began his testimony with an overview of the Space Shuttle Main Engine (SSME) and upgrades in progress to the SSME. He then emphasized the importance of future upgrades to the SSME, and pointed out the criticality of SSME safety during the high-risk ascent phase. Finally, Mr. Wood underscored Boeing Rocketdyne's commitment to success and the historical success of the Space Shuttle Main Engine.

Dr. Stephen A. Book, a member of the National Research Council's Committee on Shuttle Upgrades, began his testimony with an overview of the history of Space Shuttle upgrades. He then described, in detail, the National Research Council (NRC) process for reviewing and prioritizing such upgrades. A key NRC recommendation which came out of the review was NASA should be careful not to place too much confidence in the Quantitative Risk Assessment System (QRAS). As he described, QRAS is a useful tool to calculate risk reductions which result from various proposed modifications, but—like all software—the results are only as good as the models put into it, and much of the technologies being tested are still experimental and unprecedented. NRC's study resulted in 25 specific recommendations to NASA. In their response to the NRC report, NASA has concurred with 22 of the 25 recommendations, and expressed the need to further study the other 3.

4.4(p)—Space Transportation Architecture Studies: The Future of Earth-to-Orbit Spaceflight

October 27, 1999

Hearing Volume No. 106–41

Background

On October 27, 1999, the Subcommittee on Space & Aeronautics held a hearing to assess the results of NASA's industry-led Space Transportation Architecture Studies.

Witnesses included: Dr. Daniel Mulville, NASA's Chief Engineer and Chairman, Space Transportation Council; Dr. Michael Griffin, Executive Vice President and Chief Technical Officer, Orbital Sciences Corporation; Mr. Rick Stephens, Vice President for Reusable Space Systems, Boeing Space and Communications; Mr. Michael Coats, Vice President for Reusable Transportation Systems, Lockheed Martin Astronautics; and Mr. Thomas F. Rogers, Chairman, Sophron Foundation.

Summary of hearing

This was the last in a series of four hearings on the future of Earth-to-orbit space transportation. Starting in late 1998 NASA funded several industry partners to conduct Space Transportation Architecture Studies. These refined and analyzed various potential

space transportation development investments, including life-extending upgrades to the Space Shuttle, a post-Shuttle (or "second generation") RLV such as Lockheed Martin's proposed X–33-derived VentureStar, and assistance to the entrepreneurial spaceplane industry. The results of these studies will inform the Administration's and Congress' deliberations on the FY2001 and subsequent budgets.

Witness testimony focused on: (1) the results of the industry studies and independent assessments, particularly with regards to commercial second generation space transportation systems that could address NASA's International Space Station and related crew and cargo transportation requirements; (2) opportunities for such architectures to bridge commercial and NASA requirements, creating economic efficiencies, and also to achieve synergy with other federal space transportation investments (such as NASA's planned Crew Rescue Vehicle for the International Space Station or the Air Force's Evolved Expendable Launch Vehicle (EELV) and military spaceplane programs); and (3) NASA's transition to buying commercial space transportation services to meet its Earth-to-orbit requirements, in accordance with the legal requirements of the Commercial Space Act of 1998, and those federal investments, policy changes, or other initiatives that would be required to successfully achieve this transition.

Dr. Dan Mulville, who oversaw the NASA-industry STAS activity, testified the space agency reached out to industry for its best ideas on how to reduce launch costs while increasing safety and reliability beyond that of the current Space Shuttle and ELV fleet. While second generation RLVs offer dramatic improvements in all three areas, the current commercial launch market and state of technology are not sufficient to justify a 100 percent privately-funded RLV development effort. NASA is, therefore, developing an Integrated Space Transportation Plan that includes options for near-term Shuttle safety and performance upgrades, second generation RLV technology risk reduction, and longer-term technologies for eventual third generation RLVs. NASA's FY2001 budget submission will include initial investments towards this plan.

Dr. Michael Griffin testified Orbital Sciences Corp. has proposed developing a Crew-Cargo Transfer Vehicle (CCTV) which could fulfill the crew rescue function for the International Space Station, provide early "back-up" human access to space using an EELV booster, and later replace the Shuttle entirely using a reusable launch vehicle as its "first stage." As such the CCTV could leverage funds already planned for use in developing a Crew Rescue Vehicle while meeting the ISS' schedule. While NASA would fund development of the CCTV on a fixed-price contract, the CCTV would be commercially-owned and operated in order to spur development of commercial human activity in low Earth orbit.

Mr. Rick Stephens stated both government and industry are faced with near-term investment decisions regarding the Space Shuttle and alternative human space flight systems. Boeing has found at this time, the investment required to develop a second generation RLV, estimates of revenue levels, and capital markets' expected rates of return do not allow for a commercially-developed RLV. This "investment gap" can best be addressed by additional

government (and private) investment in technologies such as reliable low-cost propulsion, integrated vehicle health management, large-scale structures, and innovative crew escape systems.

Mr. Michael Coats testified ultimately, NASA's safety-improvement, cost-reduction, and commercial synergy goals cannot be met by a Shuttle-based architecture. However, the U.S. should not give up any of the space transportation capabilities the Space Shuttle provides until a workable and more cost-effective alternative, such as Lockheed Martin's VentureStar, is proven. A Crew Transfer Vehicle, building on lessons learned from the X–38 and its follow-on Crew Rescue Vehicle, will also be important to achieving more robust human access to space, particularly for the International Space Station. To help industry mature its RLV concepts to a point where private capital markets will invest, NASA should include operational components and integration demonstrations in its technology plans. Finally, the Federal Government should seek innovative incentives for private RLV investments.

Mr. Tom Rogers declared that using privately-developed and -operated fully-reusable launch vehicles is the most promising means of achieving much safer, more reliable, and less costly space transportation, but current efforts do not appear to be able to raise sufficient private capital. The presence of the International Space Station should allow initial fully-reusable vehicles to have less capability than the Shuttle, and therefore cost less to develop. Furthermore, the ISS' estimated Shuttle support costs presents a sufficiently large market, if bid out to the private sector, to make at least one private RLV profitable. This will offer the potential not only of reducing NASA's costs, but of opening up space to much broader and more diverse uses, promising economic, national security, and cultural benefits to our Nation.

4.4(q)—NASA's FY 2001 Budget Request: NASA Posture

February 16, 2000

Hearing Volume No. 106–70

Background

On February 16, 2000, the Subcommittee on Space and Aeronautics held NASA's annual posture hearing to review the state of the civil space program and the President's FY 2001 budget request for NASA.

Witnesses included: Mr. Daniel Goldin, NASA Administrator.

Summary of hearing

Administrator Goldin testified regarding the FY 2001 budget request for NASA, which, at $14,035 million, represented a $434.5 million increase over the FY2000 appropriation. Funding for International Space Station (ISS) fell slightly from $2,323 million to $2,114.5 million, reflecting the fact the program had passed its funding peak. The request increased funding for Space Shuttle from $2,999.7 million in FY 2000 to $3,165.7 million in FY 2001, principally to pay for new shuttle safety and operability upgrades. Funding for Science, Aeronautics and Technology—which includes NASA's space science, earth science, life and microgravity research,

and aerospace technology activities—rose from $2,192.8 million to $2,398.8 million in FY2001, principally due to the Administration's new Space Launch Initiative, which would total $4.5 billion over five years.

Administrator Goldin stressed NASA would seek to capitalize on developments in information technology, nanotechnology, and biotechnology to improve its mission performance in coming years. He further stated his belief the budget increase requested by the President would help lay the foundation to move the space program into the 21st century. Mr. Goldin was asked about NASA's responses to the Mars failures in late 1999, but declined to answer pending the completion of the Young Panel's work and the development of a new Mars architecture, stating he did not want to risk biasing the Young Panel with his personal preferences. He was additionally asked about NASA's continued reliance on Russia for the Service Module and related ISS functions. Goldin defended NASA's dependence on Russia, but expressed considerable anger at elements of the Russian aerospace industry for the diversion of Progress and Soyuz vehicles from ISS to Mir. When questioned about Russia's continuing proliferation activities and the impact those activities would have on U.S.-Russian space cooperation, Goldin replied by saying he could not comment as such matters were outside of his responsibilities.

Several members asked about NASA's educational programs and expressed concern that the President had requested cuts in funding, while others expressed their frustration with NASA's unwillingness to commit to a dedicated life and microgravity research mission aboard the Shuttle, despite the enactment of several laws requiring it do so.

4.4(r)—NASA's FY 2001 Budget Request: Human Spaceflight

March 16, 2000

Hearing Volume No. 106–70

Background

On March 16, 2000, the Subcommittee on Space and Aeronautics held a hearing on NASA's FY 2001 budget request for Human Spaceflight. NASA's Human Spaceflight activities are funded in a single appropriations account and include funding for the development and operations of the International Space Station and the Space Shuttle.

Witnesses included: Mr. Joseph Rothenberg, Associate Administrator, NASA, Human Spaceflight; Dr. Henry McDonald, Director, Ames Research Center, NASA; Ms. Roberta Gross, Inspector General, NASA; and Mr. Allen Li, Associate Director, General Accounting Office.

Summary of hearing

Mr. Rothenberg provided testimony on NASA's request for funding for the International Space Station, the Space Shuttle, Payload Utilization and Operations, Payload and ELV Support, and Investments and Support. Furthermore, he discussed NASA's expecta-

tions for the International Space Station program over the next 12 months.

Dr. McDonald discussed the internal agency review of Space Shuttle processing issues in the wake of problems in the fleet's wiring harnesses.

Ms. Gross testified regarding reports from the Inspector General's office addressing NASA's management of its Human Spaceflight activities, including the International Space Station, the X–38, and Space Shuttle processing.

Mr. Li discussed the GAO's review of NASA's compliance with its safety requirements for the International Space Station and the process for waiving those requirements. Mr. Li also discussed issues related to Russia's compliance with ISS safety requirements.

4.4(s)—NASA's FY 2001 Budget Request: Life and Microgravity Research

March 22, 2000

Hearing Volume No. 106–70

Background

On March 22, 2000, the Subcommittee on Space and Aeronautics held a hearing on the FY 2001 budget request for NASA's Life and Microgravity Science programs. The Office of Life and Microgravity Science and Applications (OLMSA) is responsible for a wide range of projects aimed at achieving NASA's expressed goal of bringing the frontiers of space fully within the sphere of human activities. The FY 2001 request for the Office of Life and Microgravity Science and Applications was $302.4 million.

Witnesses included: Dr. Arnauld Nicogossian, Associate Administrator of NASA's Office of Life and Microgravity Sciences and Applications; Dr. Richard Hodes, Director of the Institute on Aging at the National Institutes of Health; Dr. Mary Jane Osborn, Chair of the Committee on Space Biology and Medicine; Dr. Jay Buckey Jr., President of the American Society for Gravitational and Space Biology; and Dr. David G. Kaufman, President of the Federation of American Societies for Experimental Biology.

Summary of hearing

Dr. Nicogossian discussed new initiatives in the area of life and microgravity research and applications in FY 2001 and the status of current programs and activities.

Dr. Hodes discussed the nature of the collaborative research activities that have been undertaken by the National Institute on Aging in conjunction with NASA and areas of research that may be pursued in the future.

Dr. Osborn addressed a number of recent reports from the Space Studies Board including "Future Biotechnology Research on the International Space Station" and "A Strategy for Research in Space Biology and Medicine in the New Century."

Dr. Buckey provided his perspective, as a scientist and former payload specialist, on NASA's life and microgravity research programs and a summary of the views of the American Society for Gravitational and Space Biology on these programs.

Dr. Kaufman discussed the Federation of American Societies for Experimental Biology's overall perspective on NASA's life and microgravity research programs and gave an assessment of the current strengths and weaknesses of NASA's investigator-initiated research programs in life and microgravity research.

4.4(t)—NASA's FY 2001 Budget Request: Aero-Space Technology

April 11, 2000

Hearing Volume No. 106–70

Background

On Tuesday, April 11, 2000 the Subcommittee on Space and Aeronautics held a hearing on NASA's Aero-Space Technology Enterprise in the context of the President's FY 2001 budget submission. The President's FY 2001 budget request for the Office of Aero-Space Technology totals $1,193.0 million.

Witnesses included: Mr. Sam Venneri, Associate Administrator, Aero-Space Technology Enterprise, NASA; Dr. George Donohue, Professor, Systems Engineering & Operations Research, George Mason University; and Mr. Ivan Bekey, President, Bekey Designs.

Summary of hearing

Mr. Sam Venneri discussed FY 2001 plans for the Aero-Space Technology Enterprise (AST), where the focus is on integrated, long-term, innovative aerospace technology that is critical to NASA's future. He identified new technologies for space applications in concert with current programs in aeronautics and space transportation, i.e., the Space Launch Initiative.

Mr. Ivan Bekey restricted his remarks to the advanced space transportation portions of the AST Enterprise. Specifically, he provided comments on the Space Launch Initiative's second and third generation reusable launch vehicle programs. Although Mr. Bekey supports these programs in principle, he has major concerns regarding NASA's ability to achieve its future space transportation goals, given the problems associated with the X–33 program.

Mr. George L. Donohue stated the U.S. "hub and spoke" air transportation system is approaching a serious capacity crisis, where both safety and capacity are "intertwined." Further, he stated NASA's objectives for addressing this situation may not be achievable in the absence of a "fundamental rethinking" of the air transportation mode.

4.4(u)—NASA's FY 2001 Budget Request: NASA's Earth Science Program

May 10, 2000

Hearing Volume No. 106–70

Background

On May 10, 2000, the Subcommittee on Space and Aeronautics held a hearing on NASA's FY 2001 budget request for the Earth Science Enterprise. The FY 2001 request for Earth Science is

$1,405.8 million, which is an overall decrease of $37.6 million or 3.2% from the latest revised Operating Plan for FY 2000.

Witnesses included: Dr. Ghassem Asrar, Associate Administrator, NASA Earth Science Enterprise; Mr. James J. Frelk, Vice President, Geospatial Information Systems, Veridian ERIM International; Dr. Michel F. Goodchild, Director, National Center for Geographic Information and Analysis, University of California, Santa Barbara; and Mr. Jim Pagliasotti, Director Government Relations, Aerospace States Association.

Summary of hearing

Dr. Asrar discussed the progress made over the past year by the Earth Science Enterprise. Specifically, the Earth Science Program had six successful spacecraft launches, including the first major Earth Observing System, Terra. Additionally, Dr. Asrar discussed the status of the Commercial Remote Sensing Program's Scientific Data Purchase initiatives.

Mr. Frelk provided an industry perspective on NASA's execution of the Commercial Remote Sensing Program and questioned whether NASA has effectively incorporated the purchase of commercial remote sensing data as a "normal way of doing business."

Dr. Goodchild provided an overview of scientific research conducted with remote sensing data. Dr. Goodchild also discussed commercial remote sensing products currently available that would be of use to the conduct of scientific research and his assessment of the applicability of future types of commercial data for the conduct of additional types of research.

Mr. Pagliasotti provided an overview of the uses of Earth Science data to meet state and local government needs. Mr. Pagliasotti also discussed highlights of selected pilot projects to apply remote sensing data to support state and local users and an assessment of NASA's commercial data buy program in supporting state and local applications.

4.4(v)—U.S. Bilateral Space Launch Trade Agreements

May 24, 2000

Hearing Volume No. 106–105

Background

On May 24, 2000, the Subcommittee on Space and Aeronautics held a hearing on Bilateral Space Launch Trade Agreements. The hearing examined the uncertainty in the Administration's position regarding the expiration of bilateral space launch trade agreements may have on the U.S. space transportation industry. These agreements were originally intended to facilitate market entry of economies in transition, including the People's Republic of China, the Russian Federation, and Ukraine.

Witnesses included: Mr. Oren B. Phillips, Vice President, Thiokol Technologies; Mr. Jeff Foote, President, Alliant Aerospace Propulsion Company, Alliant Techsystems; Mr. Pierre A. Chao, Managing Director, C.S. First Boston; and Mr. Clayton Mowry, Executive Director, Satellite Industry Association.

Summary of hearing

Mr. Oren B. Phillips discussed the negative impact relaxation or even elimination of the space launch quotas on foreign launch service providers will have on the U.S. space transportation industry, which constitutes the total business base of the solid propulsion industry. He concludes if measures are not taken to shore up U.S. launch competitiveness, the U.S. will lose the capability to manufacture propulsion stages, which is a "unique robust, on-demand potential that is the cornerstone of our strategic missiles."

Mr. Jeff Foote's testimony echoed many of the points that were addressed by Mr. Phillips concerning the need for a space launch quotas regime for foreign launch service competitors. He gave particular attention to some aspects of the relationship between U.S. industry's launch vehicles and its government's strategic missiles and the need for a credible U.S. launch capability in maintaining the industrial base and national security.

Mr. Pierre A. Chao summarized the state of the international commercial space market from a financial perspective and how ambiguity and uncertainty regarding the issue of extending the bilateral trade agreements only serves to weaken the investment community's confidence in the commercial space industry.

Mr. Clayton Mowry made the point that the current commercial satellite market requires flexibility in scheduling and a greater selection of launch service providers is not possible under the existing space launch quota regime. He believes quotas have lost "legitimate trade purpose" they once had.

4.4(w)—Financing Commercial Space Ventures

July 18, 2000

Hearing Volume No. 106–79

Background

On July 18, 2000, the Subcommittee on Space and Aeronautics held a hearing on Financing Commercial Space Ventures. The goal of the hearing was to gain insight into the economic and market forces facing commercial space ventures and to review various financial incentives aimed to increase investment and competition in commercial space.

Witnesses included: Marcia S. Smith, Specialist in Aerospace and Telecommunications Policy, Congressional Research Service; Robert Landis, Managing Director, Telecom & Aerospace, Deutsche Banc Alex Brown; Molly Macauley, PhD, Senior Fellow, Energy and Natural Resources Division, Resources for the Future; and The Honorable Robert Walker, Chairman and CEO, The Wexler Group.

Summary of hearing

Ms. Smith provided an overview of the commercial space business and projected forecasts for commercial space markets, such as telecommunications, space tourism, remote sensing, and zero gravity manufacturing. She also provided a summary of proposed legislative initiatives related to commercial space financing, such as tax credits, tax moratoria, and loan guarantees.

Mr. Landis discussed the current and projected climate for investment in commercial space ventures, including opportunity costs between space ventures and other investments. Mr. Landis also discussed the criteria and process for evaluating commercial space venture proposals and an analysis of the impact that various financial incentives would have on investment decisions.

Dr. Macauley discussed the economic forces that drive the commercial space market, the barriers to market entry into the commercial space business, and an analysis of the relative merits of potential financial incentives to increase investment and competition in commercial space.

Mr. Walker provided his views on the challenges facing the development of the commercial space industry and an assessment of the relative merits of various types of financial incentives such as tax credits, tax moratoria, and loan guarantees to increase investment and competition in commercial space.

4.4(x)—The Technical Feasibility of Space Solar Power

September 7, 2000

Hearing Volume No. 106–87

Background

On September 7, 2000, the Subcommittee on Space and Aeronautics held a hearing to discuss the technologies needed to proceed with deployment of space solar-power collection and transmission systems, including the technical hurdles that must be surmounted, the economic feasibility of space solar-power (SSP), and NASA's role in facilitating the development of such a system.

Witnesses included: Dr. John Mankins, Manager of Advanced Concepts Studies, Office of Human Space Flight, NASA; Mr. Ralph Nansen, President of Solar Space Industries, Inc., Seattle, WA; Mr. John Fini, Senior Associate, Strategic Insight Ltd. (testifying on behalf of Dr. Molly Macauley, Resources for the Future); and Dr. Jerry Grey, American Institute for Aeronautics and Astronautics.

Summary of hearing

Dr. Mankins reviewed NASA's efforts to develop and mature technologies required prior to fielding the first generation space solar-power satellite. He indicated it would take 25 years of phased efforts before the first full-powered SSP satellite could be flown.

Mr. Ralph Nansen reviewed global energy consumption trends, asserting that world demand for hydrocarbon-based fuels would soon begin to deplete readily-available sources. He testified space solar-power represented a clean and economical alternative source, provided government and industry began to aggressively develop necessary technologies.

Dr. Jerry Grey offered assessments on current technologies (including wireless power transmission, in-space transportation, and solar-array technology development), identifying potential obstacles that must be resolved. He also outlined SSP-related research being conducted by Japan and western European countries.

Mr. John Fini summarized research undertaken by Resources for the Future—under a contract with NASA—characterizing future

electrical energy markets. Their study suggested electricity costs for the next 25 years should not be substantially different from what they are today.

4.4(y)—The State of NASA's Space Science Enterprise

September 13, 2000

Hearing Volume No. 106–70

Background

On September 13, 2000, the Subcommittee on Space and Aeronautics held a hearing on NASA's Space Science programs. NASA's Space Science Enterprise is responsible for all of NASA's programs relating to astronomy, the solar system, and the sun and its interaction with Earth. The FY 2001 request for Space Science is $2,398.8 million.

Witnesses included: Dr. Edward Weiler, Associate Administrator for Space Science at NASA; Dr. Claude R. Canizares, former Chair of the Space Studies Board at the National Research Council; and Dr. Joseph H. Taylor, Jr., co-Chair of the Astronomy and Astrophysics Survey Committee of the National Research Council.

Summary of hearing

Dr. Weiler addressed new Space Science initiatives for FY 2001 and the status of current programs and projects in the Office of Space Science, including the restructuring of NASA's Mars program.

Dr. Canizares discussed the Space Studies Board's recent reports pertaining to NASA's Office of Space Science, including "Assessment of Mission Size Trade-offs for Earth and Space Science Missions," "Continuing Assessment of Technology Development in NASA's Office of Space Science," "Scientific Assessment of 'Exploration of the Solar System: Science and Mission Strategy,'" and "Review of Office of Space Science 2000 Strategic Plan."

Dr. Taylor described the recent report of the Space Studies Board's Astronomy and Astrophysics Survey Committee "Astronomy and Astrophysics in the New Millennium."

4.4(z)—Range Privatization: How Fast, How Soon, and How Much?

September 28, 2000

Hearing Volume No. 106–88

Background

On September 18, 2000, the Subcommittee on Space and Aeronautics held a hearing entitled "Range Privatization: How Fast, How Soon, and How Much?" The hearing focused on the need for and how best to proceed in transferring range management authority from the Air Force to a non-federal entity, as a means of stimulating additional non-federal investments in U.S. space launch capabilities. One potential means of bringing additional non-federal resources to bear on the problem may be full or partial privatization.

Witnesses included: The Honorable Pete Aldridge, Jr., President of the Aerospace Corporation, former Secretary of the U.S. Air Force and Chair of the Defense Science Board Tasks Force on the national ranges; Dr. Billie Reed, Executive Director, Virginia Commercial Space Flight Authority; Dr. Ronald C. Moe, Specialist in Government Organization, Congressional Research Service; and Mr. Michael S. Kelly, Chairman, Kelly Space and Technology, Inc.

Summary of hearing

Dr. Ronald C. Moe discussed the theoretical aspects of privatization and its consequences for space launch range users in the public and private sectors. He stated because public and private sector entities have different management styles, partnerships involving the two do not generally work in creating a business-like environment for a government-owned and -operated infrastructure. He did point out the government corporation concept could be viewed, however, as an alternative to privatization, or it could serve as a transitional mechanism for achieving eventual full privatization.

Mr. Aldridge addressed the issue of U.S. Air Force divestiture from the U.S. National ranges in terms of the results from a Defense Science Board study on space launch ranges. He pointed out that more non-federal ownership of the ranges could be possible if, among other things, changes in the range ground infrastructure and Air Force cost accounting and management approaches are instituted.

Dr. Billie M. Reed provided the commercial spaceport perspective on the issue of national range privatization. He suggested privatizing some aspects of the national ranges is possible, but range operations should remain a government responsibility.

Mr. Kelly agreed with the general points made by Dr. Reed. Additionally, he advocated for the immediate start of "market-based, range privatization," which provides the actual market value of government infrastructure. Mr. Kelly believes this approach would yield greater advances in space transportation, particularly reusable launch systems, and provide the opportunity to transition towards new ways for conducting launch operations.

4.5—Subcommittee on Technology

4.5(a)—Review of the Fiscal Year 2000 Budget Request for the Technology Administration

February 11, 1999

Hearing Volume No. 106–1

Background

On February 11, the Subcommittee on Technology held a hearing to review the funding requirements for the Department of Commerce Technology Administration in fiscal year (FY) 2000. Additionally, it reviewed the Administration's FY 2000 budget request and out-year budget projections through FY 2004, and sought to determine the effectiveness of the programs under the Technology Administration.

The Technology Administration (TA) consists of the National Institute of Standards and Technology (NIST), including the Advanced Technology Program (ATP) and the Manufacturing Extension Partnership (MEP); the National Technical Information Service (NTIS); and the Office of Technology Policy (OTP). The TA is headed by the Under Secretary for Technology who serves as the principal adviser to the Secretary of Commerce on Technology Policy.

Summary of hearing

Mr. Gary Bachula, testifying as the Acting Under Secretary for Technology, U.S. Department of Commerce, stated the national investment in R&D has significantly increased. Between 1994 and 1997, total U.S. R&D expenditures were up over 13 percent in real terms, while industry increased its investment by nearly 25 percent. He stated the OTP serves as an advocate for U.S. innovation enterprise. Some initiatives include: developing an ongoing statistical analysis of corporate R&D investment in partnership with the National Science Foundation; helping the Nation meet the growing demand for skilled information technology workers by conducting town meetings through an IT web site; two new benchmarking studies in space commerce and electronic commerce to identify key areas for policy analysis and development in FY 2000; OTP serves as government secretariat for PNGV; and evaluating OTP's EPSCoT initiative, designed to foster development of indigenous technology assets in states and regions traditionally under represented in Federal R&D funding in order to foster technology-based regional economic growth. The President's request includes $2M for NTIS to cover costs associated with acquiring a product, abstracting, cataloging and indexing the title, merging into NTIS's permanent bibliographic database and physically storing or scanning it into an electronic image for electronic storage. "In 2000, the Administration also intends to submit legislation clarifying the mission of NTIS, while providing NTIS with greater operating flexibility."

Mr. Ray Kammer, testifying as the Director of NIST, stated commerce and technology are the two greatest forces shaping the world. Economists estimate technology accounts for at least 50 percent of economic growth in U.S. and other industrialized nations. He stated NIST is working to ensure world leadership through NIST's Measurement and Standards Laboratories. He pointed out NIST received two significant awards in the past year. First, the Lorentz Medal from the Royal Netherlands Academy of Arts and Science was awarded to physicists Eric A. Cornell of NIST and Carl E. Wieman of the University of Colorado at Boulder for their laboratory creation of the first Bose-Einstein condensate. Second, NIST materials researcher John Cahn was named by President Clinton to receive the National Medal of Science, the Nation's highest scientific honor. He stated the Advanced Chemical Sciences Laboratory (ACSL) building was completed on-time and on-budget. NIST is requesting $95M to be combined with $108.3M already appropriated in FY98 to build the Advanced Measurement Lab (AML) that will provide stringent controls on particulate matter, temperature, vibration, and humidity that are not attainable in current

NIST buildings. "AML will allow NIST to provide U.S. industry and science with higher quality NIST reference materials improved measurements and faster access to NIST research advances." Three million dollars is requested for Critical Infrastructure Protection to allow NIST to develop needed measurements, test methods and standards to help ensure reliability of information technology systems supporting critical national infrastructure. RNIST is requesting $500,000 to begin the Teacher Science and Technology Enhancement Program (TSTEP). NIST is always working to ensure measurement capabilities and standards are in place to support U.S. participation in global markets. "As part of this initiative NIST will help increase U.S. participation in international standards development by providing $1 million to the American National Standards Institute (ANSI), the official U.S. representative to the International Organization for Standardization and the International Electrotechnical Commission. Participation in the international standards arena will support the growth of U.S. exports by reducing technical barriers to trade." He stated NIST is attempting to build a greater consensus on ATP's value. The FY2000 ATP request for $239M allows NIST to continue multi-year projects from previous years; conduct new competitions and continue to implement a multifaceted economic evaluation program. The request of $99 million for the Manufacturing Extension Partnership (MEP) includes an effort to help small businesses better understand and deal with the year 2000 date problem. Finally, he noted that $5 million is requested for the Baldrige National Quality Awards and the program has been expanded to include the education and health-care sectors.

Mr. Johnnie Frazier, testifying as the Acting Inspector General for the Department of Commerce, stated, "In general, we found that most of NIST's plans for renovating existing laboratory space were justified and necessary if the agency is to continue its mission into the future." "In addition, we endorsed NIST's plan to construct an Advanced Chemical Sciences Laboratory (ACSL) in Gaithersburg and have confirmed NIST's need to construct an AML in Gaithersburg." NIST is accumulating funds for unified construction of this $218M facility to begin in FY2000. "The addition of the ACSL which is due to be occupied beginning later this month, the Gaithersburg AML, the currently leased building in Gaithersburg, and the vacant NOAA space to be occupied in Boulder will give NIST significantly more space than it had just a few years ago. NIST's new construction, plus its plan to renovate most of its current laboratory space, provides increased capacity to conduct research, but represents a significant investment for the Department. Given the potential magnitude of these expenditures and increases in space and capacity, it is essential that OIG, NIST, and Department officials continue to scrutinize these plans to ensure that all construction, renovation, and maintenance costs are fully justified. While we recognize that maintaining NIST's facilities and capacity will require a significant investment of funds, it is crucial that we, along with the Commerce officials, continue to challenge NIST to justify its proposed facilities expenditures and space increases." In FY98, NIST made 508 awards representing more than $262M in financial assistance under five programs: ATP, MEP, the State Tech-

nology Extension Program (STEP), the National Standards Reference Data System Program and the Measurement and Engineering Research and Standards Program. Audits found that most of NIST's programs are using appropriation merit-based criteria and competitive procedures. He noted NTIS is facing significant challenges. An audit report concluded that the agency's operations were jeopardized by declining sales for clearinghouse products and services and its core mission functions, bibliographic and archiving services had incurred losses in two of the past three fiscal years and was operating at a loss in FY98. He recommended that the Acting Under Secretary for Technology commission an outside review of NTIS operations.

4.5(b)—The Impact of Y2K: Can the Postal Service Still Deliver?

February 23, 1999

Hearing Volume No. 106–35

Background

A joint hearing was held between the Subcommittee on Technology, Committee on Science and The Subcommittee on Government Management, Information, and Technology, Committee on Government Reform. The United States Postal Service (USPS) is arguably the largest "business" in the Federal government. With over 700,000 employees, the Postal Service handles about 185 billion pieces of mail annually. This hearing featured Postal Service Inspector General Karla Corcoran, to report on the current status of USPS' Y2K initiatives. The IG presented the findings and results of her office's assessment of Y2K activities. Testimony was also received from Mr. Jack Brock of the General Accounting Office (GAO) regarding the nature of USPS' efforts. Norm Lorentz, the Chief Technology Officer of the Postal Service presented the management perspective of the current status of Y2K efforts as the USPS nears the Administration's March 31, 1999, deadline.

Summary of hearing

USPS Inspector General Corcoran stated the Postal Service is heavily dependent on automation to carry out its mission. In 1998, the postal service used automation and information systems to deliver 198 billion pieces of mail, maintain its nationwide network of over 38,000 post offices and facilities, and pay its more than 775,000 career employees. This dependency on automated systems makes the postal service highly susceptible to the Y2K problem. As a key element in our Nation's communication and commerce infrastructure, its preparedness may be crucial to the Nation's Y2K readiness. Both the private sector and government may rely on the Postal Service as a contingency if their systems fail on January 1, 2000. While the postal service has made progress in pursuing solutions to its Y2K problems, it still faces significant challenges in the ten months that remain. Corcoran then went on to highlight USPS efforts and accomplishments to date to achieve Y2K readiness; the results of their Y2K reviews; the current status of the Postal Service's Y2K Initiative; and actions the Postal Service believe should be taken to minimize risks.

Mr. Jack Brock of the General Accounting Office (GAO) stated even with the stronger management structure now in place, there are substantial challenges still facing the Postal Service. If they are not addressed adequately, these challenges will threaten the Postal Service's ability to deliver the mail on time next January. The primary challenge is time. Because the USPS has been behind schedule it is now playing catch-up. Exacerbating the time issue is the anticipated holiday business rush, which typically starts in September. This surge in workload will require Postal Service management to split its attention and resources. Second, there are still many unknowns about the Postal Service's core business processes. The USPS does not yet have complete inventory and status information on its information technology infrastructure, internal and external interfaces, and field equipment and systems. Nor does the Service know whether the majority of its critical vendors will be ready in time or have assurance that public infrastructure systems, including power, water, transportation, and telecommunications will be compliant in time. Finally, until the simulation testing is complete and contingency plans and business continuity plans are developed and tested, the Postal Service will not have reasonable assurance on its readiness.

Mr. Norm Lorentz, the Chief Technology Officer of the Postal Service, stated the Postmaster General and senior postal service management are giving Y2K significant attention, with weekly meetings of a management committee serving as a forum for reports and discussion about the status of the Year 2000 program. This is one of the most important public policy issues they are facing this year. The Postal Service is doing everything possible to minimize and eliminate the potential for disruption that could arise from the Year 2000 computer problem. The Postal Service is part of the Year 2000 contingency plans of many organizations that rely on electronic communications, whether benefit payments by federal agencies, electronic payments in the private sector, or simple data transmission from person to person. This means their readiness efforts must focus on maintaining the ability to process and deliver normal mail volumes as we enter the new year, and to absorb additional volumes that could be diverted from the electronic message stream. Mr. Lorentz reiterated that the USPS is up to the management challenges it faces and expects to be Y2K compliant in a timely manner.

4.5(c)—Unscrewing the Fastener Quality Act

February 25, 1999

Hearing Volume No. 106–2

Background

This hearing was the third in a series of hearings to review the need for the 1990 Fastener Quality Act (FQA) (PL 101–592). The hearing focused on the Department of Commerce's report on the fastener industry and discussed recommendations for amending the FQA, including the views of fastener manufacturers, distributors and consumers.

Passed by Congress in 1990, the FQA requires all threaded, metallic, through-hardened fasteners of one-quarter inch diameter or greater, that directly or indirectly reference a consensus standard, to be tested or documented by a National Institute of Standards and Technology (NIST) certified laboratory. Despite its enactment in 1990, implementing regulations for the Act were not finalized until April 14, 1998. NIST's current final rule was developed only after legislative changes were adopted to the Act in 1996.

At that time, Congress was convinced that foreign manufacturers were actively engaged in unfair trade practices that resulted in the dumping of "substandard" fasteners in the United States market. Most of the problems were associated with the federal procurement of fasteners at the Defense Industrial Supply Center (DISC) and National Aeronautics and Space Administration (NASA). It was determined most substandard fasteners originated from foreign companies in Japan, Mexico, Spain, Korea, Taiwan, and Poland, and were the result of apparent attempts to undercut legitimate U.S. fastener manufacturers with products that were manufactured specifically to a cheaper standard rather than the result of a poor manufacturing process.

As a reaction to the report and hearings, Congress passed FQA. Despite its passage in 1990, FQA has never been implemented. Questions about the number and adequacy of laboratories necessary to test fasteners in a timely manner, the definition of fasteners covered by the Act, and the need for FQA have plagued the law and prevented implementation of a final NIST rule.

On February 25, 1999, the Subcommittee on Technology held a hearing on "Unscrewing the Fastener Quality Act." The hearing was held to review the FQA. Witnesses included: Mr. George Parker, Vice President Association of International Automobile Manufactures, Inc. Arlington, VA; Mr. Ed McIlhon, President, Iowa Industrial Products, Inc., Cedar Falls, IA; and Mr. John M. O'Brien, Vice President, Federal Screw Works, FQA Reform Coalition, Detroit MI.

Summary of hearing

Mr. John O'Brien, Vice President, Federal Screw Works testified there is a need to develop a new FQA that would ensure the continued safety of fasteners used for commerce, but would not impose unnecessary and costly burdens on fastener manufacturers or their customers. Mr. O'Brien stated the FQA, as it stands now, is fatally flawed because it forces reliance on testing procedures and protocols that have been eclipsed by technology and improved practices. To substantiate these claims, Mr. O'Brien stated dramatic advances in manufacturing technology and the implementation of quality assurance systems have resulted in a dramatic reduction of the defect rates in the fastener industry. Furthermore, he stated purchasers of fasteners today have taken on the responsibility of ensuring the quality of products they buy at the beginning of the transaction—before the fastener reaches the assembly line. Mr. O'Brien suggested the thrust of the FQA should be toward preventing the intentional sale or offering sale of mismarked, substandard or counterfeit fasteners—and not toward the regulation of manufacturing and testing procedures. Mr. O'Brien agreed with the

proposed requirement that manufacturers register a copyright insignia they imprint on fasteners.

Mr. Edward J. McIlhon, President, Iowa Industrial Products Corporation testified there is no longer a basis or need for the FQA. Mr. McIlhon sited the Edgerly Report entitled, "Is there Still A Basis For The Fastener Quality Act?" which concluded the major problems identified in the 1988 Congressional investigation and report have been resolved, and there is no longer a basis for the finding that the health and safety of Americans is threatened by the widespread sale of mismarked, substandard and counterfeit fasteners. Mr. McIlhon feels the current solution offered by NIST is still unworkable because it is too encumbered by the original language of the FQA that would require redundant and unnecessary testing. Furthermore, he stated the current Act does not permit retesting and recertification of fasteners produced before its date of implementation, and this could result in a $1 billion loss to the industry. Mr. McIlhon testified the current Act's requirements pertaining to accredited laboratories are unworkable, and because a sufficient number of laboratories have not been available to conduct the required testing the Act has been delayed three times. He also mentioned the current Act is an impediment to trade with our partners in Europe. Mr. McIlhon concluded by stating the following are certain portions of the Act he believes should be preserved: The record of manufacturers' fastener insignias by the Patent and Trademark Office (PTO) to assure the trace-ability of fasteners after they are placed into service; The use of accredited laboratories to assure the quality of laboratories involved in testing fasteners under appropriate consensus and government standards and specifications: and the use of grade identification markings on fasteners as a means of helping original equipment manufacturers assure that only properly manufactured and graded fasteners will be used in safety critical applications.

Mr. George Parker testifying on behalf of the Association of International Automobile Manufacturers stated the current FQA would not provide any higher levels of fastener quality and would be a step backward and impose costs without benefits. He stated although there is not substantial evidence that there are any fastener quality problems, the auto industry believes any potential fastener quality problems that produce safety risks would derive from mismarked, substandard, and counterfeit fasteners. Furthermore, the auto industry believes the record before Congress supports a conclusion that there are no quality or safety problems with fasteners used in major industries. Mr. Parker stated most major end users have systems in place to ensure only the highest quality fasteners are used in their products. Mr. Parker concluded by stating if Congress believed a law was needed on general fastener quality, the auto industry recommends such a law be directed at deterring the introduction of non-conforming fasteners into commerce and to generally provide commercial and government customers with greater assurance that fasteners meet stated specifications. Such a law should recognize the actions major end users take to ensure only high quality fasteners are used in their products, and should also recognize the Quality Assurance Systems in place to produce high quality fasteners. Finally, Mr. Parker stated such a

law should incorporate the concept of self-certification of the Safety Act.

4.5(d)—Year 2000 Problem at the Department of Defense: How Prepared is our Nation's Security?

March 2, 1999

Hearing Volume No. 106–47

Background

The Executive Branch of the Federal Government has approximately 6,500 computer systems that have been identified as essential to the performance of the government's most important functions. These systems are known as "mission critical." DOD itself has 2,300 mission-critical systems, which account for more than one-third of all mission-critical systems in the Federal Government. As of February 12, 1999, DOD reported only 72 percent of these mission-critical systems were to be Year 2000 compliant. In December 1998, however, DOD reported 81 percent of its mission-critical systems were compliant. Since August 1997, the Department's Inspector General (IG) has issued 142 audit and inspection reports pertaining to DOD organizations or functions and their Year 2000 conversion progress. The General Accounting Office (GAO) issued two reports last year that expressed concerns with DOD's slowness in fixing its mission-critical systems. At that time, GAO concluded Defense lacks complete and reliable information on systems, interfaces, other equipment needing repair, and the cost of its correction efforts.

Witnesses included: Mr. Robert J. Lieberman, Assistant Inspector General for Auditing, Department of Defense; Mr. Jack L. Brock, Jr., Director, Government-wide and Defense Information Systems, U.S. General Accounting Office; and Dr. John J. Hamre, Deputy Secretary of Defense, Department of Defense.

Summary of hearing

Dr. John J. Hamre, Deputy Secretary of Defense, Department of Defense, stated the Y2K problem is particularly critical because of DOD's dependence on computers and information technology for its military advantage. The Department of Defense helped nurture the computer industry, but now they must deal with the difficulties generated by retaining legacy systems. Of all the Departments in the Federal Government, DOD has the largest number of computer systems. These are not simply weapons systems, the category best prepared for Year 2000, but command and control systems, satellite systems, the Global Positioning System, highly specialized inventory management and transportation management systems, medical equipment, and important systems for payment and personnel records. The complexity of DOD operations results in an enormous scope, variety and number of information technology systems, all potentially vulnerable to the Y2K problem. In summary, DOD has the largest and most comprehensive evaluation plan in the Department's history, and is continuing to work to refine plans and improve the overall evaluation of core DOD functions. This plan will significantly improve DOD's levels of confidence in their

ability to carry on operations despite Y2K. While these extensive efforts will mitigate risk, the interconnectedness of everything guarantees that Y2K will have an impact on DOD. To deal with this reality, DOD must focus on realistic contingency plan and continuity of operations planning. The key elements of the DOD contingency plan effort involves common guidance, focusing on core missions and functions, an adequate management oversight structure, and DOD engagement with other agencies and activities. Using the GAO guidelines, we have published DOD policy and guidance that requires every system, mission, and function owner to develop and test contingency and continuity of operations plans.

Mr. Jack L. Brock, Jr., Director, Government-Wide and Defense Information Systems, U.S. General Accounting Office, stated this dilemma is particularly daunting for the DOD for two reasons. First, DOD's size and scope of operations, criticality of mission, and heavy reliance on a diverse portfolio of information technology is unparalleled in either the public or private sector. Second, despite considerable progress in the last 3 months, DOD is still well behind schedule. This is largely because DOD did not have the necessary oversight and management framework for handling large-scale department-wide information technology projects. DOD has recently taken steps to strengthen management of its Year 2000 program. The Year 2000 program has been demanding on DOD because of the size and scope of its operations and its heavy reliance on information technology, but also because it began the effort with weak and undisciplined information technology management processes. DOD still faces two significant challenges and a fast approaching deadline. First, the Department must still "catch up" and complete remediation and testing of mission critical systems. Second, it must have a reasonable level of assurance that key processes (functional areas) will continue to work on a day-to-day basis and key operational missions necessary for national defense can be successfully accomplished. Such assurance can only be provided if the Department takes steps to improve its visibility over the status of key business processes. This information is critical to identify those areas where it faces the greatest risk of failure and critical to providing the necessary data for preparing overall business continuity plans.

Mr. Robert J. Lieberman, Assistant Inspector General for Auditing, Department of Defense, stated the DOD is overcoming the increased risk posed by its belated start on several facets of the Y2K conversion effort. As the intensive effort continues, the IG remains committed to their partnership with the Department on this difficult matter and will continue striving to provide DOD, the President's Council on Y2K Conversion, the Office of Management and Budget, and Congress with reliable, candid and timely feedback on Y2K progress. The IG emphasizes the need for robust in-depth testing. The sheer number of systems involved, the risk of incompatible Y2K fixes because of the number of different firms and individuals involved in remediating code, and the compression of this ambitious testing schedule into just over a year pose a formidable management challenge. It is the most daunting of the remaining Y2K challenges. The IG will be looking for indicators of good test planning, such as detailed written test plans; management controls to

ensure appropriate oversight of both the test plans and the reporting of test results; and provision for sufficient technical support before, during, and after the test. The IG fully anticipates that numerous previously undetected and perhaps unanticipated "glitches" will surface during each of the various types of tests. If not, the rigor of the tests—and their credibility—may be called into question.

4.5(e)—Soaring into the Future: Funding Requirements for FAA R&D

March 4, 1999

Hearing Volume No. 106–4

Background

On March 4, the Subcommittee on Technology met to review the FAA's research and development request for FY2000 and beyond. Of particular interest to the Subcommittee is the activities of the FAA's Research, Engineering & Development (RE&D) account which is utilized by the agency in its efforts to improve the national air traffic control system by increasing its safety, security, capacity, and productivity. The RE&D request also includes funds for human factors research, aviation medical research, and environmental research. The hearing discussed several issues pertaining to the RE&D authorization level. Specifically, the Subcommittee was interested in whether the FAA RE&D Advisory Committee's and the aviation industry's recommendations were reflected in the FY2000 RE&D budget request. Other issues discussed included: whether the FAA's National Airspace System modernization effort has been hampered by problems traceable to weaknesses in the agency's R&D portfolio; if the overall FAA R&D funding level is adequate enough to support the modernization of the National Airspace System; and finally, if the FAA RE&D Advisory Committee and aviation community are comfortable with the respective roles of the FAA and NASA in federally funded civil aviation research.

Summary of hearing

Mr. Zaidman, Associate Administrator for Research and Acquisitions, Federal Aviation Administration (FAA), testified that the FAA had increased its partnerships with industry, academia, and other government agencies. He testified it has always been a goal to stress the importance of partnerships which leverage the use of available government research funds. Mr. Zaidman stated the agency continues to work on reducing the accident rate, and has been particularly encouraged by this year were there have been zero fatalities in commercial aviation. Mr. Zaidman credited the FAA/NASA partnership in research and technology as one of the backbones in the effort to improve aviation safety. He stated both agencies are collaborating on aging aircraft and wake vortex research, as well as developing improved technologies for predicting wind shear, detecting aircraft icing, and detecting clear air turbulence. Mr. Zaidman also discussed the FAA's partnership with industry in the Safe Flight 21 program that when operational will provide critical weather and safety information directly to the cock-

pit. Mr. Zaidman concluded his testimony by discussing a new runway safety system which utilizes a foam-like product that has been installed at a few airports to help prevent future incidents when aircraft roll off the end of runways.

Ms. Stefani, Deputy Assistant Inspector General for Aviation, U.S. Department of Transportation, testified the FAA is requesting $173 million in RE&D funding for FY2000. This is an increase of about 15% over the amount appropriated last year. Ms. Stefani also testified there have been some changes in how the FAA finances its R&D efforts, specifically significant amounts of development efforts for air traffic control have been funded from the Facilities and Equipment account rather than RE&D. Ms. Stefani also stated FAA and NASA research has produced very valuable aviation technology, like windshear radar. Ms. Stefani stated the FAA's work on the Standard Terminal Automation Replacement System (STARS), data link, and the deployment of new explosives detection systems, has underscored the need for FAA to take an early and active role in resolving human factors in the development of new technology. Ms. Stefani concluded by testifying the Safe Flight 21 program is intended to test and validate technologies required for Free Flight. Specifically, the program will focus on 9 operational enhancements, like display of terrain in the cockpit. Ms. Stefani stated the FAA is requesting $16 million for Safe Flight 21 for FY 2000.

Mr. Robert Frenzel, Senior Vice President for Aviation Safety and Operations, Air Transport Association of America, urged full funding out of the FAA's R&D FY 2000 Budget for the Safe Flight 21 program because it is an important step in the development and demonstration of new technologies which will be vital to Free Flight. Mr. Frenzel stated that Free Flight has been embraced by the FAA and the aviation community as the solution to projected growth in the National Airspace System in the future. He expanded on this point by adding when fully implemented the Free Flight program will dramatically increase efficiency and reduce costs associated with air travel.

Mr. Robert Doll, Chairman, FAA Research Engineering & Development (RE&D) Advisory Committee (REDAC), testified in general the REDAC is concerned about the level of the RE&D budgets that have been allocated to the FAA over the past several years. Mr. Doll stated many of the REDAC members are very concerned that as a Nation we are rapidly giving away our traditional lead in the aviation industry to European interests. He is particularly concerned with the strides that the Europeans have made in the area of Air Traffic Management. Mr. Doll expressed the possibility if this issue is not addressed we are looking at a situation where our airlines are going to be faced with the choice of equipping their aircraft with dual avionics systems or flying them with European equipment set to European rules and standards.

4.5(f)—Impact of Litigation Caused By Failures Related to Y2K

March 9, 1999

Hearing Volume No. 106–3

Background

On March 9, 1999, the Subcommittee on Technology, Committee on Science and the Subcommittee on Government Management, Information, and Technology, Committee on Government Reform held a hearing entitled, "The Impact of Litigation on Fixing Y2K." The hearing was held to review the potential costs of litigation due to the Y2K problem.

Witnesses included: Mr. Tom Donohue, President and CEO, U.S. Chamber of Commerce; Professor Walter Effross, American University, Washington School of Law; Ms. Abbie Lundberg, Editor in Chief, CIO Magazine; Mr. Howard Nations, Former Vice President, American Trial Lawyers Association; and Mr. Walter Andrews, Partner, Wiley, Rein & Fielding.

Summary of hearing

Chairwoman Morella and Chairman Horn discussed the potential liability issue and that despite passage of the Year 2000 Information and Readiness Disclosure Act last year, some companies remain unwilling to share Y2K information. In general, witnesses had mixed reactions to the proposed legislation, H.R. 775, the Year 2000 Readiness and Responsibiliy Act. Mr. Donohue supported the bill.

Mr. Tom Donohue, President and CEO, U.S. Chamber of Commerce testified that unlike other national emergencies hit without any warning we have the opportunity to directly address the Y2K problem before it hits. Mr. Donohue stated the business community is willing to do its part in fixing the Y2K problem, and compensate those who have suffered legitimate harms. However, Mr. Donohue asked Congress pass legislation that would reduce the likelihood of frivolous litigation by placing limits on the fees attorneys stand to gain from this problem.

Professor Walter Effross, American University, Washington School of Law, testified the legal system was sufficiently equipped to deal with the potential flood of Y2K litigation. Mr. Effross saw no need for any further legislation that would help businesses overcome potential lawsuits.

Ms. Abbie Lundberg, Editor in Chief, CIO Magazine, testified businesses should be held accountable for their Y2K problems, and should be able to be prosecuted to the full extent of the law. However, she added, many inconveniences we are all sure to encounter should not be allowed to clog up the courts. Ms. Lundberg concluded by stating the threat of litigation has not impeded businesses' ability to fix the Y2K problem, instead she felt it has acted as a powerful stimulus for giving the problem the serious attention it deserves.

Mr. Howard Nations, Former Vice President American Trial Lawyers Association, testified there is no need for federal legislation regarding Y2K liability because the common law principles,

state statutes and the Uniform Commercial Code, provide all of the business rules and guidelines needed to measure the conduct of business entities. Mr. Nations stated the one trillion-dollar cost estimated for Y2K litigation, was fictitious, not based on any scientific study, and had no basis other than guesswork.

Mr. Walter Andrews, Partner, Wiley, Rein & Fielding, testified as of March 9, 1999, fifty-four Y2K related lawsuits had been filed. Mr. Andrews stated due to the magnitude of potential Y2K costs, businesses must take steps now to ensure that their systems are compliant. He stated comprehensive Year 2000 legal audits, in conjunction with aggressive Year 2000 assessment and remediation programs, are what businesses need to do in order to avert a potential Y2K catastrophe. Mr. Andrews stressed that legal counsel can be part of the Year 2000 solution by helping businesses take responsibility for addressing their Y2K problems and to minimize their liability exposure.

4.5(g)—Will Transportation and the FAA Be Ready for the Year 2000?

March 15, 1999

Hearing Volume No. 106–46

Background

On March 15, 1999, the Technology Subcommittee met to examine the progress the Federal Aviation Administration (FAA) has made to face the challenges of the Year 2000 (Y2K) computer problem in their computer and information systems. The Technology Subcommittee held three hearings last year to investigate the efforts of the FAA in addressing Y2K, specifically as it relates to the mission critical components of the air traffic control system. At the hearings, GAO and others testified that potential serious Y2K consequences include degraded aviation safety, grounded or delayed flights, increased airline costs, and customer inconvenience.

Summary of hearing

Mr. Joel Willemssen, Director, Civil Agencies Information Systems Accounting and Information Management Division, testified the FAA has made tremendous progress in its Y2K remediation efforts. However, Mr. Willemssen stated there still is much work to be done and the agency continues to face challenges in making internal systems Year 2000 compliant. He testified the risk of failures by external organizations, such as airports and foreign air traffic control systems, could seriously affect the FAA's ability to provide aviation services—which could have a dramatic effect on the flow of air traffic across the Nation and around the world. To avert the risk from external and internal failures, Mr. Willemssen stated the FAA needs a sound business continuity and contingency plan.

Mr. Kenneth M. Mead, Inspector General, U.S. Department of Transportation, testified the FAA and the DOT have made a great deal of progress addressing their respective Y2K problems. However, he cautioned that much work still remains to be completed. Furthermore, Mr. Mead testified he has a much higher level of con-

fidence today than a year ago that DOT's mission-critical systems, such as air traffic control, will be compliant before October 1999. Mr. Mead also stated the DOT has taken an active role in reaching out to the transportation industry, which has resulted in a high level of Year 2000 awareness.

Ms. Jane F. Garvey, Administrator, Federal Aviation Administration, testified since February 1998, the FAA has worked around the clock to make sure that air travel would be as safe and efficient as possible come midnight December 31, 1999. Ms. Garvey asserted not only has the FAA caught up with much of the rest of the Federal Government, but in many cases has surpassed the expectations of many. She moved on to state at the turn of the millenium the FAA would be ready. Ms. Garvey concluded by cautioning even though much work has been completed the FAA still has many obstacles to face in the coming months.

Mr. Mortimer L. Downey, Deputy Secretary, U.S. Department of Transportation, testified to the commitment he and Secretary Slater ensure DOT systems will operate properly before, during, and after the millennium change. Mr. Downey stated as of March 12, 1999, 64 percent of the Department's 607 mission-critical systems were Y2K compliant, and reported by March 31, 1999, 85 percent were projected to be compliant. He stated the systems projected to be completed after June belong to the U.S. Coast Guard. Mr. Downey testified even with the confidence he has that many of the Departments goals will be reached extensive efforts are underway to prepare business continuity and contingency plans.

4.5(h)—Are the Federal Government's Critical Programs Ready for January 1, 2000?

April 13, 1999

Hearing Volume No. 106–53

Background

The hearing presented the Office of Management and Budget (OMB) and the General Accounting Office (GAO) with the opportunity to report on the status of the Executive Branch's Year 2000 efforts. In addition, this hearing laid the groundwork for the executive branch to demonstrate the overall readiness of its critical business functions—functions the American public relies upon. Testimony was given from four agencies that have yet to testify in joint Y2K hearings before the Technology Subcommittee, Committee on Science and the Government Management, Information and Technology Subcommittee, Committee on Government Reform: the Department of Agriculture, the Agency for International Development, the Department of State, and the Department of the Treasury. The agencies reported on: (1) the compliance status of mission-critical systems in meeting the President's stated March 31, 1999, deadline; and (2) steps being taken to ensure their respective high impact programs will be ready for the new millennium.

Witnesses included: Jacob Lew, Director, OMB (invited, with testimony given by Deidre Lee, Acting Deputy Director for Management, OMB); Joel Willemssen, Director, Civil Agencies Information Systems, GAO; Anne Reed, Chief Information Officer, Department

of Agriculture; James Flyzik, Chief Information Officer, Department of the Treasury; and Fernando Burbano, Chief Information Officer, Department of State, accompanied by Richard Nygard, Chief Information Officer, Agency for International Development.

Summary of hearing

Chairwoman Morella stated 92 percent of Federal systems have met the government-wide goal of Y2K compliance, but eleven agencies are not yet compliant. Mr. Willemssen stated there is still continuing reason for concern and a need for federal-state partnerships.

Ms. Lee stated 92 percent of the Federal Government's mission critical systems met the government-wide goal of Y2K compliance by March 31. Overall progress is tribute to the hard, skillful work of thousands of Federal employees and contractors. Thirteen of the 24 major Federal departments reported that 100 percent of their mission critical systems are Y2K compliant; three agencies are between 95 to 99 percent Y2K compliant (DOC is among the three); four agencies are between 90 and 94 percent Y2K compliant; and three agencies are between 85 and 90 percent Y2K compliant. USAID has not completed implementation of its seven mission critical systems.

On March 26, 1999, OMB issued guidance to agencies that identify 42 high-impact programs and directed Federal agencies to take the lead on working with other Federal agencies, state, tribal and local government contractors and banks to ensure programs critical to public health and safety will provide undisrupted services. "While it is expected the business continuity and contingency plans will continue to change through the end of the year as agencies update and refine their assumptions and will continue to test and modify, we have asked agencies to submit their plans no later than June 15. We will work with the agencies to assure government-wide consistency of their basic assumptions surrounding the Year 2000."

Mr. Willemssen stated some vital government functions still remain with systems that are not yet compliant. Not all of the government's systems have undergone independent verification and validation. Achieving compliance of individual systems does not necessarily ensure a key business function will continue to operate through the change of the century. He claims end-to-end testing is very important. Business continuity and contingency plans are essential. Lead agencies must provide to OMB a schedule and milestones of key planned activities for high-impact priorities. About one-quarter of high-impact programs are state-administered programs such as food stamps and Medicaid—some programs are at risk. Recent data from OMB on state-administered systems shows that there is a continuing reason for concern and a need for federal-state partnerships—large number of state systems reported not due to be compliant until late in 1999.

Ms. Reed added USDA is currently tracking 350 mission-critical systems—93 percent of these systems are compliant and fully deployed. Priorities are to achieve 100 percent compliance and implementation of all mission-critical and non-mission-critical systems. "We're working with state partners in territories that actually de-

liver the services to the public. Since June of 1997, USDA and other federal departments have jointly established expedited approval procedures for state acquisition of ADP resources, necessary to support their Y2K efforts." States must share their business continuity and contingency plans with us. Twenty-six states have programs which complement the Food Safety and Inspection Service health program. They anticipate no major disruptions to the food supply, and will continue to support outreach to small businesses. They will also continue programs in cooperation with DOC and SBA.

Mr. Nygard was confident mission-critical systems will be Y2K compliant before the end of this year. However, they did not achieve Y2K compliance by the end of March 1999, the government-wide target date. Problems were discovered during the testing phase, thus delaying efforts and forcing a move back in the completion date. These delays were the result of problems encountered outside the systems and were caught in testing broader processes. Substantial work is needed to renovate USAID's new management system which performs accounting, budgeting and procurement functions. Mr. Nygard believes it will be renovated and fully tested and implemented by the end of July. They will be working closely with the Department of State and other agencies who operate overseas to assure that essential functions will continue next January.

Mr. Burbano believes the State Department has made significant progress in readying its systems. They have completed the remediation of all 59 mission-critical applications and completed implementation of 53 of 59 mission-critical systems. The department has established a rigorous year 2000 compliance certification process and plans to conduct a process-based end-to-end test of business functions. The department is finalizing contingency plans to ensure continuity of core activities. "On the international front, the Department of State has developed an overseas contingency planning tool kit to allow each of the embassies and consulates and missions the ability to develop location-specific contingency plans by balancing the needs and priorities of the particular post against the year 2000."

Mr. Flyzik claims the Treasury has identified 328 mission-critical systems of which 293 or 91.8 percent are year 2000 compliant. IRS is 90 percent compliant. Financial Management Service is able to make 90 percent of its payments (over 775 million annual payments) using year 2000 compliant and tested systems, including monthly social security and supplemental security income payment, veterans' benefits payments, IRS tax refunds, railroad retirement board annuity payments, federal salary payments and vendor payments. U.S. Customs met year 2000 compliance goals for its mission-critical systems by September,1998. They have established interagency services programs to address interconnections and interoperability of disparate systems. They are also designing a Treasury Emergency Information Coordination Center to address any contingency planning needs at Treasury. Costs continue to rise and estimates now are $1.92B, of which about $1.53B are appropriated resources.

4.5(i)—The Melissa Virus: Inoculating Our Information Technology from Emerging Threats

April 15, 1999

Hearing Volume No. 106–5

Background

On April 15, 1999, the Subcommittee on Technology held a hearing on "The Melissa Virus: Inoculating Our Information Technology from Emerging Threats." This hearing was held in order to describe the features of the "Melissa" computer virus and explore its impact on the Federal Government and the private sector.

Witnesses included: Mr. Raymond Kammer, Director, National Institute of Standards and Technology; Mr. Michael Vatis, Director, National Infrastructure and Protection Center, FBI; Dr. Richard Pethia, Director, CERT Coordination Center, Carnegie Mellon University Software Engineering Institute; and Keith Rhodes, Technical Director, Office of the Chief Scientist, U.S. General Accounting Office.

Summary of hearing

Mr. Raymond Kammer, Director, National Institute of Standards and Technology, testified the Melissa virus is what is known as a denial of service attack, whereby servers and routers are literally overwhelmed by e-mail. Mr. Kammer stressed we as a Nation must maintain a proper perspective in developing computer security solutions and not target the problem of the moment. Mr. Kammer stated NIST is taking a broad perspective and the agency has several initiatives underway to strengthen the IT security infrastructure of the U.S. economy.

Mr. Michael Vatis, Director, National Infrastructure and Protection Center, FBI, testified the Melissa virus is a macro virus spread through Microsoft Word 97 or Word 2000 e-mail attachments. He explained the problem with this particular virus was its ability to spread quickly. Mr. Vatis moved on to state we are fortunate this virus did not do more damage. However, he added its occurrence should serve as a wake up call for both the government and the private sector, because the virus exploited known vulnerabilities. Mr. Vatis stated the notifications and information provided by the NIPC, CERT, and others demonstrated the value of cooperative efforts by the private and government sectors.

Mr. Rich Pethia, Director of the CERT Coordination Center (CERT/CC), Software Engineering Institute (SEI) at Carnegie Mellon University stated CERT/CC provides assistance to computer system administrators in the Internet community who report security problems and coordinate the response with other sites affected by the same incident. CERT/CC is also responsible for the day-to-day operations of the Fed CIRC (Federal Computer Incident Response Capability) Operations Center, that provides incident response and other security-related services to Federal civilian agencies. He described CERT's experience with the Melissa virus including giving early warning to DOD incident response teams, the Fed CIRC Management Office, the FBI and other sensitive sites

within eight hours after receiving the first report of the Melissa virus. He stated the press acted responsibly in reporting the Melissa virus news accurately. He warned Melissa is another warning siren of the increasing vulnerability of our networks and recognized the need for enhanced incident response capability, faster communications, better analytical tools and techniques to solve problems.

Mr. Keith Rhodes of the GAO testified the Melissa virus disrupted the operations of thousands of companies and some government agencies, but did not reportedly permanently damage systems and did not compromise government data. "Moreover, Melissa has clearly highlighted the urgent and serious need for strong agency and government-wide protection over sensitive data." He discussed broader implications of the Melissa virus including how quickly viruses can proliferate due to extensive connectivity of today's networks; how hard it is to trace any virus back to its source; and Melissa demonstrated vulnerabilities in widely adopted commercial-off-the-shelf (COTS) products can be easily exploited to attack all their users. He noted it is likely that the next virus will propagate faster, do more damage and be more difficult to detect and to counter. He warned Federal agencies need to implement long-term solutions to protect systems and sensitive data. He stated it is critical the Federal government establish reporting mechanisms that facilitate analyses of viruses and other forms to computer attacks and their impact. Finally, he noted GAO's Information Security Best Practice guide offers a good framework for agencies to follow—sustained government-wide leadership needed to ensure executives understand the risks, and monitor agency performance.

4.5(j)—Genetics Testing in the New Millenium: Advances, Standards, and Implications

April 21, 1999

Hearing Volume No. 106–7

Background

On April 21, 1999, the Subcommittee on Technology held a hearing entitled, "Genetics Testing in the New Millenium: Advances, Standards, and Implications." The Human Genome Project (HGP), a joint venture between the National Institutes of Health (NIH) and the Department of Energy (DOE), is a collaborative international research program designed to map the many different genes, perhaps as many as 100,000 different varieties, contained in the human body. In large part due to the work of the HGP, it is now possible to test for an individual's predisposition to certain genetic disorders such as breast cancer or heart disease. Despite its promise for the future, there still exist many unanswered questions surrounding the development of new genetic tests, especially those that can be used to predict future diseases in healthy or apparently healthy individuals. The hearing focused on technological advances in genetics testing and its future implications and also examined the need for quality assurance, accuracy standards of testing procedures, and accreditation of laboratories that perform genetics testing.

Witnesses included the Honorable Raymond Kammer, Director, National Institute of Standards and Technology, Gaithersburg, MD; Dr. Francis S. Collins, Director, National Human Genome Research Institute, Bethesda, MD; Dr. William F. Raub, Deputy Assistant Secretary of Science Policy, Department of Health and Human Services, Washington, DC; Dr. Michael Watson, Professor of Pediatrics and Genetics, Washington University School of Medicine, St. Louis, MO.

Summary of hearing

Dr. Collins provided the Subcommittee with an overview of the work of the Human Genome Project (HGP) and the goals the HGP hoped to achieve in the next five years. Based on the genetic discoveries of the HGP, he indicated there are currently about 550 genetic tests being used in the diagnosis of disease and predicted that number would greatly increase in the coming years. He indicated these tests should not be offered in a clinical setting without knowing the reliability and validity of the test. Dr. Collins stated there is a need to implement the proper regulatory and legal framework for the successful integration of emerging genetic technologies and the recommendations provided by the Task Force on Genetics Testing were a good starting point.

Mr. Kammer testified the National Institute of Standards and Technology (NIST) plays a critical role for the genetic testing community by developing the measurements and standards that are necessary for U.S. industry to determine the accuracy and reliability of emerging genetic testing technologies. He also noted NIST has had a long history of working with the NIH, DOE, and other federal agencies associated with the HGP to provide the needed tools and standards required for accurate measurements.

Dr. Raub testified the Department of Health and Human Services was in the process of establishing a Secretary's Advisory Committee on Genetics Testing as recommended by the Task Force on Genetics Testing. The role of the Advisory Committee, which is comprised of individuals from all areas of the genetics field, is to help the Department craft policies that will allow for the proper oversight and regulation of new genetics tests while at the same time allow this exciting new field to flourish.

Dr. Watson, testifying on behalf of the Task Force on Genetics Testing, relayed to the Subcommittee the key recommendations set forth in the Task Force's report. He also indicated the Task Force focused on three major areas: scientific validity of tests, laboratory quality, and the delivery of the service to consumers. In addition, he testified as the genetics field continues to grow at an unprecedented pace, it will be important for the Department of Health and Human Services to have its Secretary's Advisory Committee up and running to continue to access the development of the field.

4.5(k)—Y2K in Orbit: Impact on Satellites and the Global Positioning System

May 12, 1999

Hearing Volume No. 106–6

Background

On May 12, 1999, the Subcommittee on Technology along with the Subcommittee on Government Management, Information, and Technology, Committee on Government Reform held a hearing. With just over 200 days remaining until the date rollover, this hearing was a status report on the Y2K impact on our Nation's satellite systems and the Global Positioning System (GPS) from representatives of the National Aeronautics and Space Administration (NASA), the Department of Defense (DOD), the General Accounting Office (GAO), and an industry trade association. Satellite networks are a critical link to communications worldwide, from cellular phones to weapons guidance and aircraft navigation. Yet, the computers running those networks could be Y2K vulnerable since those networks rely on computers that are controlled by thousands of software programs and millions of lines of programming code.

Witnesses included: Mr. Lee B. Holcomb, Chief Information Officer, National Aeronautics and Space Administration; Dr. Marvin Langston, Deputy Chief Information Officer, U.S. Department of Defense; Mr. Neil R. Helm, Member, Communications Systems Technical Committee, American Institute of Aeronautics and Astronautics; and Mr. Keith Rhodes, Technical Director for Computers and Telecommunications, United States General Accounting Office.

Summary of hearing

Mr. Rhodes stated the Global Positioning System (GPS) is the Department of Defense's primary radionavigation system, and the GPS has become an integral asset in numerous civilian applications and industries, including emergency services, airlines services, commercial fishing and shipping, corporate vehicle fleet tracking, and surveying. It also plays a critical role in communications networks and, hence, the Internet. The system is affected by both the Year 2000 computing problem and a problem associated with the way the system keeps track of time. Rhodes believed it is vital organizations make an effort to determine (1) whether the networks they operate rely on GPS equipment as a time source and (2) the potential GPS-related risks. Once the problem and its potential impact are known, organizations and individual users can (1) modify receivers, (2) replace them with newer models, or (3) contact their service providers to ensure that GPS receivers supporting their telecommunications networks are not susceptible to the upcoming end-of-week rollover. Because the rollover is less than 4 months away, however, organizations must take these measures as quickly as possible.

Dr. Langston stated the DOD has the largest and most comprehensive evaluation plan in the Department's history, and is continuing to work on refining plans to improve the overall evaluation of core DOD functions. This plan will significantly improve the

level of confidence in the DOD's ability to carry on operations despite Year 2000. While these extensive efforts will mitigate risk, the interconnectedness of everything guarantees the Year 2000 will have an impact on DOD. To deal with this reality, DOD must focus on realistic contingency planning. Langston said the Department of Defense will be prepared to execute its national security responsibilities before, on, and after January 1, 2000. The Department's comprehensive systems compliance efforts, operational evaluations and end-to-end testing, and systems and operational contingency plans are being developed and executed within a solid management structure. All Year 2000 efforts are receiving the personal attention of the Department's senior leadership. Finally, these efforts are being rigorously scrutinized by independent auditors, including the Department's Inspectors General and the General Accounting Office.

Mr. Holcomb stated the rollover problem with GPS is a technical problem similar to but not directly related to Y2K. Two upcoming events may affect civil GPS users and government users of commercially procured receivers—GPS End of Week rollover and Y2K issues. GPS End of Week rollover happens every 20 years because GPS system time, counted in weeks, started counting on January 6, 1980. At midnight between August 21 and 22, 1999 the GPS week will rollover from week 1023 to 0000. This could be interpreted as an invalid date in GPS receivers that were not designed to meet GPS specification. The Department of Defense is the service provider for GPS and has verified all generations of GPS satellites and ground support systems are Y2K and End of Week rollover compliant. NASA has assessed the impact of this known problem with GPS receivers, and has replaced or upgraded a small number of GPS receivers where required, either for this GPS-unique problem, or due to Y2K reasons. Holcomb said NASA does not anticipate problems with GPS receivers on August 21, 1999 or on January 1, 2000. Additionally, NASA remains confident that the probability of a Y2K-related failure of NASA-controlled assets and systems is very low.

Mr. Helm stated the Y2K problem has been examined by the U.S. commercial satellite communications vendors and service providers. The results of the examination indicate that because spacecraft onboard timing clocks are not referenced to calendar dates, there will be no space segment anomalies with the Year 2000 rollover. However, problems will be found in early designs of ground-segment equipment, both in the hardware and software. The major companies are currently addressing these problems with a rigorous compliance program, and are informing their customers if and when modifications need to be made.

4.5(l)—Easing Traffic Congestion and Improving Vehicle Safety: ITS and Transportation Technology Solutions for the 21st Century

May 20, 1999

Hearing Summary No. 106–16

Background

On May 20, 1999, the Subcommittee on Technology held a hearing to review the use of Intelligent Transportation Systems (ITS) and other advanced transportation technologies to ease traffic congestion and to improve vehicle safety.

Witness included: The Honorable Kenneth Wykle, Administrator, Federal Highway Administration; Mr. Robert Merryman, Acting Director, Montgomery County (MD) Department of Public Works and Transportation; and, Mr. William J. Harris, Member—Board of Directors, Intelligent Transportation Society of America.

Summary of hearing

Administrator Wykle testified the Department of Transportation is attempting to utilize advances in information technology, communications and navigations to establish an electronic transportation system providing unprecedented safety, mobility and productivity. The department's strategy is to build an intelligent infrastructure that includes cameras and detectors to monitor and respond to highway conditions, to control traffic and to communicate the information to travelers. Administrator Wykle identified a five step approach towards implementing an intelligent infrastructure: (1) define a national architecture; (2) define the standards that are necessary to ensure interoperability; (3) build a foundation through 80 field operations and tests; (4) develop a professional workforce to support infrastructure operations; and (5) utilize deployment incentives for communities to expand their existing infrastructures. Finally, Administrator Wykle also laid-out a comprehensive plan to bring technology into vehicles through the Intelligent Vehicle Initiative which seeks to utilize technology to improve traveler safety.

Mr. Merryman, testifying on behalf of Montgomery County Department of Public Works and Transportation, stated his department has turned to technology like Intelligent Transportation Systems (ITS) to address the transportation problems of the Nation's second-most congested area. In Montgomery County, ITS has been successfully utilized to reduce travel times, fuel consumption, improve transit operations, and lessen environmental impacts of transportation. Mr. Merryman noted Montgomery County's advanced transportation management system (ATMS) includes a computerized traffic signal system that controls over 700 signals, 80 ground-based cameras, Global Positioning Satellite (GPS) tracking and broadcasting equipment that allows the County to transmit real-time traffic information to the public. Finally, Mr. Merryman stated communities all over the country are seeking to develop systems similar to Montgomery County's ATMS and that technology holds great potential for tackling congestion and other traffic problems of the future.

Mr. Harris, testifying on behalf of ITS America, stated that the advancement of ITS over the last eight years has revolutionized transportation all over the world. Here in the U.S., ITS is working in public and private partnership with the government (federal, state and local) and industry to advance ITS focusing on both infrastructure and in-vehicle technologies. Mr. Harris pointed-out collaboration is needed to develop a more effective ITS workforce, to address technical and institutional barriers of widespread ITS deployment, and to achieve ITS America's goals of improved transportation efficiency and enhanced vehicle safety. Finally, Mr. Harris thanked the Science Committee for their leadership and support for ITS and transportation research and development.

4.5(m)—Federal Research and Small Business: A Review of the Small Business Innovation Research Program

June 17, 1999

Hearing Volume No. 106–26

Background

On June 17, 1999, the Subcommittee on Technology held a hearing on "Federal Research and Small Business: A Review of the Small Business Innovative Research Program." The hearing was held to review the SBIR program.

Witnesses included: Susan Kladiva, Associate Director, Energy, Resources and Science Issues, General Accounting Office; Timothy Foreman, Deputy Director, Office of Small and Disadvantaged Business Utilization, Department of Defense; Charles Wessner, Program Director, Board on Science, Technology, and Economic Policy, National Academy of Sciences; and Robert Archibald, Professor of Economics, The College of William and Mary.

Summary of hearing

Susan Kladiva, Associate Director, Energy, Resources and Science Issues, General Accounting Office, testified in the 16 year history of the SBIR program it has provided over 45,000 awards worth $8.4 billion in 1998 dollars to thousands of small high-technology companies. Ms. Kladiva stated much concern has been raised regarding the concentration of awards in certain states and companies—commonly known as "frequent winners." Ms. Kladiva noted the GAO report on the SBIR program found the programs 25 most frequent winners, which represent fewer than 1 percent of the companies in the program, received about 11 percent of the programs awards from fiscal year 1983 through fiscal year 1997. However, she stated that one third of the companies receiving awards from fiscal year 1993 through fiscal year 1997 were first-time winners, which indicates the program is attracting an average of 750 new companies annually.

Timothy Foreman, Deputy Director, Office of Small and Disadvantaged Business Utilization, Department of Defense, testified the SBIR program represents a major commitment by the federal government to harness the potential of our small technology companies. Mr. Foreman stated the SBIR program has proven to be a highly effective vehicle for harnessing this important small busi-

ness resource for U.S. military and economic strength. He noted there have been independent studies dating back to the late 1980s that have consistently confirmed the value of the SBIR program. Mr. Foreman concluded by stating he anticipates the changes DOD has made in its SBIR program over the last few years will further strengthen its contribution to our Nation's military and economic capabilities.

Charles Wessner, Program Director, Board on Science, Technology, and Economic Policy (STEP), National Academy of Sciences, testified the formal findings of the STEP board have not yet been released, and the remarks by Dr. Archibald do not represent the formal findings of the panel. Rather, they represent an interim and partial illustration of its ongoing research and analysis. Mr. Wessner stated STEP is in the process of developing its recommendations for the Defense Department and when these have been completed they will be sure to share them with the Committee.

Robert Archibald, Professor of Economics, The College of William and Mary, testified he was not reporting the formal findings and recommendations of the National Academies. Professor Archibald stated the result of his survey was that the DOD SBIR program was fulfilling its directives well. Professor Archibald testified that his initial findings are commercial success in the program has not come at the expense of research quality, and the Fast Track has been an effective tool to encourage commercialization without apparent harm to research quality.

4.5(n)—Federal Agencies Under Attack: Why Are Government Websites Vulnerable?

June 24, 1999

Hearing Volume No. 106–32

Background

On June 24, 1999, the Technology Subcommittee held a hearing to review recent cyber-attacks on Federal websites, and the steps taken by the National Institute of Standards and Technology (NIST) and the National Security Agency (NSA) to assist Federal agencies in their security plans as mandated by the Computer Security Act of 1987.

Witnesses included: Mr. Raymond Kammer, Director, NIST; Mr. Michael Jacobs, Deputy Director, Information Systems Security, NSA; and Mr. Keith Rhodes, Technical Director, Office of the Chief Scientist, U.S. General Accounting Office.

Summary of hearing

Mr. Kammer, testifying on behalf of NIST, stated his agency is responsible in assisting federal agencies in the protection of sensitive unclassified systems by developing and promulgating security standards and guidelines. NIST's computer security program focuses on: cryptographic standards and guidelines; public key infrastructure; security research, agency assistance and the National Information Assurance Partnership which is jointly managed by NIST and the National Security Agency to focus on increasing the

number and quality of IT security products. Besides promoting software evaluation, NIST promoted giving agencies the ability to quickly respond to attacks by creating, in 1996, the Federal Civilian Incident Response Capability (FedCIRC), a joint effort with two existing incident handling teams. FedCIRC has transitioned from NIST to GSA, which uses the technical services of the Computer Emergency Response Team at Carnegie-Mellon University and works closely with the National Infrastructure Protection Center. NIST is developing the Advanced Encryption Standard that will provide strong cryptographic protection in the future. Security risk management, planning, training and budget are critical and must be addressed by all agencies. NIST recommendations for agencies to secure networks include: (1) implementing security policies consistent with agency mission; (2) embracing obvious solutions such as patching systems with current security patches, taking action consistent with security advisories, deploying virus detection tools, firewalls, intrusion detection software and vulnerability scanners; (3) testing own systems continuously; (4) configuring systems with security in mind; (5) buying security technology that has been tested by an independent party; and (6) supporting security despite limited IT budgets.

Mr. Jacobs, testifying on behalf of NSA, stated a valuable partnership has evolved between NSA and NIST in providing both security solutions for government as well as advancing solutions in the private sector. For example: (1) under the National Information Assurance Partnership (NIAP), NIST and NSA collaborate on the specification, testing and evaluation of new information security products in accordance with internationally recognized Common Criteria; (2) yearly, NSA and NIST sponsor the National Information Systems Security Conference to promote and educate the information technology and security community on the threats and innovations to electronic communications that attracts about 2000 participants from industry, academia and government agencies; (3) NSA has supported NIST on the Advanced Encryption Standard by independently evaluating candidates AES algorithms—future. NSA support will include assessing the impact on hardware design of these algorithms; (4) NSA and NIST have participated on various Public Key Infrastructure working groups over the past five years to support the development of Public Key Infrastructure for the Government; and (5) NSA supports NIST in the development of biometrics, network security, random number generators and the Biometric Consortium. Finally, Mr. Jacobs warned that due to an escalation in the destructive nature and aggressive pace of attacks, agencies and the private sector must remain vigilant against evolving techniques hackers use to test protective measures.

Mr. Rhodes, testifying on behalf of GAO, noted websites offer efficiency and productivity benefits to agencies and citizens. Websites open up avenue of security risks which can range from embarrassing to theft of sensitive information. To maximize the advantages offered by web sites and the Internet, it is imperative that Federal agencies implement security programs that will enable them to closely watch information resources for signs of intrusion and to quickly react to intrusions when detected. It is important for the Federal Government to implement effective strategy that will

(1) ensure agencies focus on security from an organization wide perspective and implement a comprehensive set of security controls and (2) establish central tracking and reporting mechanisms that facilitate analyses of website attacks and other forms of attacks and their impact.

4.5(o)—H.R. 2086, Networking and Information Technology Research and Development Act of 1999: Resources for IT Research

July 1, 1999

Hearing Volume No. 106–27

Background

On July 1, 1999, the Subcommittee on Technology held a legislative hearing on H.R. 2086, The Networking and Information Technology Research and Development Act of 1999. The hearing focused on three provisions of the bill: (1) the role of internships in meeting the demands for competent IT researchers; (2) the role of the Research and Development Tax Credit to leverage private sector dollars; and (3) the availability of encryption technologies.

Witnesses included: Dr. William Destler, Interim Vice President for University Advancement, University of Maryland, College Park, MD; Ms. Laura Allbritten, Director of Tax, PeopleSoft, Inc, Pleasanton, CA; and Mr. Kevin Hassett, Resident Scholar American Enterprise Institute, Washington D.C.

Summary of hearing

Dr. William Destler testified the United States corporate sector has been steadily reducing its expenditures on medium and long term research and development in order to remain price competitive with companies abroad. He stated it is especially true in the areas of computer networking, encryption, and information technology due to the intense competition for expanding world markets. Compounding these problems is the fact the U.S. corporate demand for information technology professionals currently far outstrips supply, thereby raising IT labor costs and limiting corporate expansion even when opportunities for growth are strong. Dr. Destler testified in order for the United States to maintain its position of global leadership in these critical areas it is essential that H.R. 2086 become law.

Ms. Laura Allbritten testified making the existing Research and Development (R&D) tax credit permanent best serves the country's long term economic interests. She argued by eliminating uncertainty over the credit's future the permanent extension would allow R&D performing businesses to make important long-term business decisions regarding research spending and investment in the United States. Furthermore, by creating an environment favorable to private sector R&D investment through the permanent extension, jobs and economic value would remain in the United States. She concluded by stating the R&D tax credit is essential for the United States economy in order for its industries to compete globally.

Mr. Kevin Hassett testified research and development is a classic example of an activity that has external benefits: when a firm un-

covers something new, the knowledge will ultimately help other firms perform their own R&D. Therefore, the benefits to society of R&D are likely to be higher than the benefits to individual firms doing the research, since these firms tend to look only at their own payoffs. Therefore, without the R&D tax credit, it is likely there would be relatively little R&D from society's perspective. Mr. Hassett continued by stating the current situation where the R&D credit is continually renewed exposes firms to a great deal of uncertainty which likely leads them to respond with less R&D than they might otherwise do with the credit. Mr. Hassett stated if the credit were to become permanent, the benefits could well be higher, since the uncertainty surrounding its renewal would be removed. He cited a Coopers and Lybrand report which estimated that a permanent credit would stimulate an additional $41 billion of R&D spending between 1998–2010, but would produce more than $58 billion worth of new goods over this same period. Thus concluding that the credit would more than pay for itself. Mr. Hassett also favored the R&D tax credit because it would go along way in restoring faith in the basic tenets of our tax system.

4.5(p)—The Computer Security Impact of Y2K: Expanded Risks of Fraud?

August 4, 1999

Hearing Volume No. 106–23

Background

The purpose of this hearing is to review concerns raised by a number of information technology experts that Y2K fixes may pose a substantial security threat to computer operating systems. The concern is Y2K employees, hired to correct systems, might have left "trap doors" or other means through which they can clandestinely take control of systems, including those that electronically move $11 trillion a year among financial institutions, corporations, governments and private organizations. The computer security threat, however, may not be limited to just being financially motivated. Some programmers hired to fix Year 2000 problems may be quietly installing malicious software codes—such as a logic bomb or a time-delayed virus to sabotage companies or gain access to sensitive information sometime in the new millennium. Most troubling is several security firms say they have already found "trap doors" in Y2K programming, creating the possibility that those with malicious intent can gain access to the systems at a future date. If used successfully for hostile purposes, these computer "trap doors" may create a unique vulnerability for sensitive national and proprietary information systems to be accessed, stolen, compromised, or disrupted.

Witnesses included: Mr. Joe Pucciarelli, Vice President and Research Director, GartnerGroup, Inc.; Mr. Harris Miller, President, Information Technology Association of America; Mr. Dean Rich, Vice President for Security Services, WarRoom Research; and Mr. Wayne Bennett, Chair, Commercial Technology Practice Area, Bingham Dana LLP.

Summary of hearing

Mr. Pucciarelli stated the law of very large numbers dictates we have a vastly increased risk of electronic theft and fraud after the Year 2000 remediation efforts. In the rush to aggressively solve Y2K, enterprises need to ensure appropriate resources have been rededicated to protecting them from the increased risks of electronic theft or fraud. This is possibly the most important artifact created by Year 2000 remediation. Specific steps need to be taken now and continually reemphasized because, despite our wish for highly stable, status quo operations, changes in competition, business models and distribution channels will bring a much more dynamic operational norm. Specifically, Pucciarelli recommends the most effective theft and fraud deterrent is the perception that there are very high levels of security. To accomplish this, the GartnerGroup advises organizations to collaborate to create a Year 2000 security team composed of individuals with the requisite technical and auditing skills to review procedures, assess the risks and implement a risk containment plan. These procedure reviews must limit the ability of a single individual to make changes or initiate activities without a second person participating in the process. Risk assessment must include reviewing all enterprise insurance coverage as well as contracts with external services providers and independent (programmer) contractors. Additionally, risk management plans should include careful reconsideration of all existing theft and fraud deterrence activities in light of this expanded threat profile.

Mr. Miller stated the information technology is a $1.8 trillion global industry with great economic benefits for countries around the world. The Year 2000 software glitch and other well-publicized episodes of natural or man-made disasters have also triggered an awareness of the importance and vulnerabilities posed by disruptions to information technology. But to focus on the issue of computer malfeasance through a Y2K lens primarily is to peer at the issue from the wrong end of the telescope. Information Security is the next Y2K issue for the IT community and its users. Aggressors attack at the point of maximum leverage. For modern society, this means critical infrastructure—transportation, telecommunications, oil and gas distribution, emergency services, water, electric power, finance and government operations. Government and industry must work to prevent such attacks. While achieving common ground on the issue is vital, the roles for government and industry in the information security realm are likely to be quite different. Not surprisingly, difficult questions remain.

Mr. Bennett stated while concerns about Y2K and computer security are each considerable and justified, he would caution against concluding any significant multiplier is at work; or the possibility of fraud exacerbates the risk that is inherent and already being addressed in connection with the Y2K problem—namely, the risk critical operations will be disrupted because of systems that are not Y2K compliant. The Nation's IT personnel are right now working at a breakneck pace doing thankless, yeoman's work against an unforgiving deadline. If they succeed in their Herculean task, some will question why we spent billions of dollars on a crisis that never came about; if they fail, they will be blamed. At this point, Mr.

Bennett suggest we let the security officers quietly pursue their job while we lend all necessary support to the employees and contractors working on the Y2K effort—without any inadvertent suggestion from Congress that any of them might be criminals, even in the face of continuing risk. The job of fixing the Y2K problem and the consequences of failure so enormous that the on-going risk of fraud, particularly at a time when detection methods, as well as accountability, have improved pales by comparison.

Mr. Rich addressed the Y2K vulnerability issue. While he believes this is a valid threat and agrees it needs to be addressed today, many of the Fortune 500 companies have been "outsourcing" source code development and maintenance for years. A large number of these U.S. companies have permanent network connections into their corporate networks to facilitate the work from overseas. Without intrusion detection or traffic analysis, these foreign companies have the potential to run free and obtain unauthorized access to U.S. corporate propriety information. Rich recommends programs that support a total "Risk Management" approach to Infrastructure Assurance. He recommends protecting the "critical path" and life cycle of high value infrastructure, not just the end product.

4.5(q)—FAA and January 1, 2000: On-Time or Delayed?

September 9, 1999

Hearing Volume No. 106–51

Background

On September 9, 1999, the Subcommittee on Technology held a joint hearing with the Subcommittee on Government Management, Information, and Technology, Committee on Government Reform, to review the Y2K status of the Federal Aviation Administration's (FAA) computer and automated information systems. This hearing is the fifth time the Subcommittee has met to review this issue.

Witnesses included: the Honorable Jane Garvey, Administrator, Federal Aviation Administration (FAA); The Honorable Kenneth Mead, Inspector General, U.S. Department of Transportation; and Mr. Joel Willemssen, Director, Civil Agencies Information Systems, U.S. General Accounting Office (GAO).

Summary of hearing

Administrator Garvey, testifying on behalf of the FAA, announced as of June 30, 1999, the FAA has completely implemented all Y2K fixes in their systems. An independent contractor has reviewed the documentation and verified the FAA's work. Administrator Garvey noted that the FAA is committed to making sure the National Airspace System (NAS) will remain safe and efficient through the Y2K change and has added a post implementation phase to their Y2K efforts to ensure all systems remain compliant. The FAA continues to work with all of their business partners on a Business Continuity and Contingency Plan which details actions the FAA should take should Y2K problems arise. She noted the FAA has completed visits to the top 150 airports in the U.S. and found most will complete Y2K efforts by October while the rest plan to conclude by December. Finally, Administrator Garvey stat-

ed international aviation has been more of a challenge to the agency. Through cooperation with the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA), serious progress has been made with most international partners. However, Administrator Garvey warned that the FAA would not compromise the safety of U.S. air travelers. If the FAA has any safety concerns, the agency will delay or cancel flights accordingly.

Mr. Mead, testifying as the Inspector General, stated while the FAA has set-up an impressive management approach towards addressing Y2K and has ambitiously worked to mitigate potential problems, there are no guarantees that all Y2K related system glitches have been found in internal systems or external sources. He noted controllers and technicians will need retraining in the event they must revert to special procedures as part of a contingency plan for radar or other mission critical system failures. Mr. Mead stated the FAA is working with domestic air carriers and that 83 percent of airport systems are reported to be Y2K compliant. He expects large carriers are handling Y2K preparations well, but there are some concerns with smaller carriers because they have not been forthcoming with compliance information. Mr. Mead stated he would be more confident if the FAA had followed his recommendations and required to certify compliance. Finally, he stated two significant "uncertainties" remain with international air travel: (1) fifty-three countries still had not replied to an ICAO survey; and (2) a policy has not been established on allowing U.S. carriers to fly to countries that either did not respond to the survey or that cannot give sufficient assurance they are Y2K ready.

Mr. Willemsen, testifying on behalf of GAO, stated the FAA has made excellent progress in tackling the Y2K problem, but warned the work is not done. He identified a number of challenges remaining, including managing modifications to compliant systems, independent verification of systems' compliance, and systems testing. Mr. Willemsen also pointed out the FAA must mitigate risks posed by external organizations (including airports, airlines, and foreign air traffic control systems) which have the potential to impede the flow of air traffic across the Nation and around the world. Finally, Mr. Willemsen noted the FAA must have a comprehensive and tested business continuity and contingency plan ready to implement, and train its staff in how to do so.

4.5(r)—National Technical Information Service: A Review of the Department of Commerce's Plan to Terminate the Agency

September 14, 1999

Hearing Volume No. 106–37

Background

On September 14, 1999, the Subcommittee on Technology held a hearing to examine the Department of Commerce's plan to close the National Technical Information Service (NTIS). NTIS, which was created in the 1950s, is the Federal Government's central clearinghouse for the collection and dissemination of U.S. and international science and technical information. Since 1987, NTIS

has been a self-sustaining entity funding itself through the sale of its publications and documents. However, with the advent of the Internet, many consumers can obtain science and technical information for free. Accordingly, it is likely NTIS, operating under its current business model, can no longer remain self-sustaining. On August 11, 1999, Secretary of Commerce, William Daley, announced his plan to close NTIS and transfer its core archiving functions to the Library of Congress. The Department's plan requires Congressional approval.

Witnesses included: The Honorable Robert Mallett, Deputy Secretary, Department of Commerce, Washington, DC; The Honorable Michael DiMario, Public Printer, The Government Printing Office, Washington, DC; Mr. Ken Allen, Chairman, NTIS Advisory Board, Springfield, VA; Ms. Caroline Long, Assistant University Librarian for Collection Service, George Washington University, Washington, DC; and Ms. Bonnie Carroll, President, Information International Associates, Inc, Oak Ridge, TN. Mr. James Billington, Librarian, Library of Congress, Washington, DC, provided written testimony for the record.

Summary of hearing

Mr. Mallet testified the Department believes the economics of the Internet will dramatically affect NTIS' ability to remain a self-sustaining entity under its current business model. Mr. Mallet explained the Department's plan for dealing with NTIS, which includes closing the operation by the end of FY 2000 and transferring its core archiving functions to the Library of Congress. He did not indicate what the financial impact on the Library of Congress would be to assume NTIS' mission. In addition, he proposed the DOC would make sure federal agencies post their technical and business reports on the Internet to ensure consumer access. He said the DOC would attempt to place NTIS' approximately 260 employees who cannot be absorbed into Commerce with other federal agencies. Mr. Mallet also testified the Department had not consulted outside user groups of NTIS, the Library of Congress, or other interested parties before releasing its proposal to the public.

Mr. DiMario proposed transferring NTIS' archiving and dissemination functions to the Government Printing Office (GPO). He testified GPO would make the collection available to the public free-of-charge through the Federal Depositories Library program. He also said GPO would, for a fee, sell documents requested for ownership by individuals. Mr. DiMario indicated that transferring NTIS' collection to GPO would consolidate the government's primary information dissemination programs under a single agency. While GPO was in the process of analyzing NTIS' operations at the time of the hearing, he did testify it was likely GPO would require a federal appropriation to maintain the collection and make it available to the public.

Mr. Allen stated he believed there is still a need for some entity to perform NTIS' core functions even in today's information age. He testified it is no longer likely NTIS can survive on a full cost recovery basis operating under its current model. He recommended a study be performed to look at ways to restructure NTIS or to examine what other federal entity should undertake the mission of act-

ing as a central clearinghouse for science and technical documents. He urged the Department to include all interested parties in further discussions of NTIS' future.

Ms. Long testified she was appearing before the Subcommittee on behalf of the American Association of Law Libraries, the American Library Association, the Association of Research Libraries, the Medical Library Association, and the Special Libraries Association. Ms. Long called for a full assessment of NTIS' services to determine how best to make sure the public still has access to NTIS' documents. She said NTIS should not be closed until there is a thorough study of the full range of NTIS services, of alternatives for providing each service, and of the requirement the program remain self-sustaining.

Ms. Carroll stated there are clear benefits to having a central depository for science and technical information. She indicated one immediate impact of Commerce's plan might be the burden of cost would be shifted to the general taxpayer from the user who directly benefits from the services in the current NTIS cost recovery operation. She called for a thorough assessment of NTIS and its mission before moving forward with any plan to close the agency or transfer its functions to another federal entity.

Mr. James Billington testified if NTIS cannot continue in its present form, the Federal Government must examine which of its functions are sufficiently desirable and effective to merit continued federal support, and how and where such functions can best be sustained to ensure public access and permanent availability. He indicated given the proper resources, the Library might be a logical successor to NTIS for those functions that complement the Library's mission—namely collecting, cataloging, and providing public access. However, he testified he felt that NTIS' other functions, such as high volume document distribution, brokering agency databases to the information industry, and publication of information products of executive agencies, were beyond the Library's mandate.

4.5(s)—The Year 2000 Computer Problem: Implications for International Travel

September 15, 1999

Hearing Volume 106–52

4.5(t)—Overcoming Barriers to the Utilization of Technology in the Classroom

September 22, 1999

Hearing Volume No. 106–44

Background

On September 22, 1999, the Subcommittees on Technology and Basic Research held a joint hearing, which focused on technology in the K–12 classrooms. In particular, the hearing examined the appropriate role of local, state, and Federal programs in helping schools get connected; the barriers that prevent schools from implementing successful technology programs; and how the private sec-

tor can be harnessed to assist schools in bringing technology into the classroom.

Witnesses included: Dr. George O. Strawn, Executive Officer, Computer and Information Science and Engineering Directorate, National Science Foundation, Arlington, VA; Mr. Alan Spoon, President, The Washington Post, Washington, DC; Dr. Elizabeth Glowa, Director for Instructional Technology Support Team, Office of Global Access Technology, Montgomery County Public Schools, Rockville, MD; and Mr. James Fallon Jr., Superintendent of Schools, East Hartford School District, East Hartford, Connecticut.

Summary of hearing

Dr. Strawn provided an overview of the National Science Foundation's involvement with the creation of the Internet and its use in the classroom. He testified since 1996, NSF has supported R&D in novel technologies that could lower the cost of and/or lower other barriers to bringing the Internet to public school and libraries. He testified there is a need to better understand the costs, capabilities, human resource requirements, and potential educational benefits of universal high speed internet access for all schools. Finally, he said NSF stands ready to work with Congress and other stakeholders in education technology to develop an effective mechanism to inform policymakers in the rapidly evolving world of networking.

Mr. Spoon testified on behalf of the CEO Forum on Education and Technology. The CEO Forum is a coalition of corporate and academic leaders who joined together in 1996 to form a four-year partnership to access and monitor progress toward integrating technology in American schools. He stated the CEO Forum has committed to releasing four reports examining different areas of education technology and his testimony would focus on the Forum's third report dealing with teacher training. He stated it is important for schools to invest in professional development so teachers can successfully integrate technology in the classroom. Otherwise, schools are at risk of wasting scarce resources on technology that will not be utilized to its fullest potential. He went on to list a set recommendations put forth by the CEO Forum to help guide schools in preparing their teachers.

Dr. Glowa testified if technology is to realize its powerful potential for improving education, it must be used for more than just automating the traditional methods and practices of teaching. She further stated positive changes in the learning environment brought about by technology are more evolutionary than revolutionary. She stated these changes occur over a period of years, as teachers become more experienced with technology and instructional implementation strategies and are supported by effective staff development efforts. She highlighted in her testimony a list of barriers to effectively utilizing technology in the classroom.

Mr. Fallon testified regarding the steps East Hartford School District had undertaken to integrate technology in the classroom. He stated funding for technology continues to be a major obstacle—especially when schools must weigh spending money on hardware and infrastructure against spending money on staff development and technology support. He stated new technologies that facilitate the sharing of teaching units and expertise among teachers and

school districts over the World Wide Web promise a much more effective use of resources than has been possible by isolated, individual teachers acting alone.

4.5(u)—Small Manufacturing and the Challenges of the New Millennium

September 23, 1999

Hearing Volume No. 106–43

Background

On September 23, 1999, the Subcommittee on Technology held a hearing entitled "Small Manufacturers and the Challenges of the New Millenium." Small manufacturers, those with less than 500 employees, contribute greatly to our Nation's economic growth, creating thousands of new jobs each year and providing all Americans with high quality manufactured goods. In recognition of the vital contribution small manufacturers make toward our national prosperity, 1999 was declared the "Year of the Small Manufacturer." The hearing examined the challenges facing small manufacturers in the 21st Century and reviewed the appropriate role of government, industry, and academia in helping to ensure continued growth in this important sector of our economy.

Witnesses included: The Honorable Ray Kammer, Director, National Institute of Standards and Technology, Gaithersburg, MD; Mr. Jerry Jasinowski, President, National Association of Manufacturers, Washington, DC; Mr. John Churchill, Quality Assurance Director, Wilcoxin Research, Gaithersburg, MD; and Mr. Norm Braddock, President, Saginaw Remanufacturing, Saginaw, MI.

Summary of hearing

Mr. Kammer testified the National Institute of Standards and Technology (NIST), the National Association of Manufacturers, and the Modernization Forum had recently convened a national summit on small manufacturing in Washington, DC. The Summit examined four topics of importance to small manufacturers: electronic commerce, workforce, international trade, and sustainable manufacturing. He also stated NIST's Manufacturing Extension Partnership (MEP) program provides hands-on assistance to small manufacturers. He said through the MEP network of local extension centers, each one linked to public and private organizations with complementing expertise, small manufacturers have access to comprehensive sets of technology and business assistance. He testified MEP centers have provided services to more than 77,000 manufacturers. He also gave examples of specific small manufacturing companies that have been assisted by MEP. Finally, Mr. Kammer described other programs at NIST, such as the Measurements and Standards Laboratories, that help benefit small manufacturers.

Mr. Jasinowski discussed in detail the four topics addressed at the National Summit on Small Manufacturing. He said the number one issue facing small manufacturers is finding qualified workers to fill employment slots. He said many small manufacturers want to hire more minorities and older Americans but lack the resources to adequately train them. On the subject of E-Commerce, Mr.

Jasinowski suggested that NIST MEP institute a website that will provide small manufacturers with advice on getting started in e-commerce. Mr. Jasinowski testified many small manufacturers were not participating to their fullest extent in international trade because of daunting trade barriers. He said programs such as the Export-Import bank were important for small manufacturers. Mr. Jasinowski also said we need greater flexibility and cooperation in environmental quality enhancement between the Federal government and the private sector. Finally, he stated he supported the work of NIST MEP and looked forward to working in partnership with them to ensure small manufacturers continue to thrive.

Mr. Churchill stated he had utilized the services of his local MEP affiliated office on many occasions. He testified that advice from the MEP affiliate helped to decrease his company's products failure rates and product warrant returns, thus affecting about 50 percent of their sales.

Mr. Braddock described for the Subcommittee his experience with the Saginaw Valley State University's Center for Manufacturing Improvement (an affiliate of Michigan MEP). He stated their expertise helped him to better understand how the production process contributes to the overall cost of the product, thus allowing him to provide more accurate quotes to potential customers. Mr. Braddock testified he gained a great deal of knowledge from the National Summit and appreciated the opportunity to discuss with other small manufacturers ways to improve their businesses.

4.5(v)—A Review of H.R. 2413—The Computer Security Enhancement Act of 1999

September 30, 1999

Hearing Volume No. 106–45

Background

On September 30, 1999, the Technology Subcommittee held a hearing to review H.R. 2413, the Computer Security Enhancement Act of 1999, legislation introduced by Chairman Sensenbrenner, Congresswoman Morella and Congressman Gordon.

Witnesses included: Mr. Raymond Kammer, Director, National Institute of Standards and Technology; Mr. Keith Rhodes, Director, Office of Computer and Information, Technology Assessment, U.S. General Accounting Office; Mr. Harris Miller, President, Information Technology Association of America; and Dr. George Trubow, Professor and Director, Center for Information Technology and Privacy Law, The John Marshall Law School and Member, Computer System Security and Privacy Advisory Board (CSSPAB), NIST.

Summary of hearing

Mr. Kammer testifying on behalf of NIST, stated NIST's computer security program focuses on standards and guidelines, public key infrastructure and security research. Mr. Kammer noted the President has recently requested an additional $39 million in FY 2000 for initiatives proposed to protect critical infrastructure, of which $5 million would be for NIST to establish an Expert Review Team to assist Government-wide agencies in adhering to federal

computer security requirements. NIST would consult with OMB and NSA on the team's plan to protect computer security for federal agencies. $2 million would fund a 15 member team responsible for helping agencies identify vulnerabilities, plan secure systems and implement Critical Infrastructure plans. $3 million would establish an operational fund at NIST for computer security projects among federal agencies. Projects would include independent vulnerability assessments, computer intrusion drill and emergency funds to cover security fixes for systems identified to have unacceptable risks.

Mr. Rhodes, testifying on behalf of GAO, stated H.R. 2413 aims to reinforce the role of NIST, whose mission is to provide guidance and technical assistance to government and industry to protect unclassified information systems. Mr. Rhodes discussed: (1) the urgent need to strengthen computer security across the Federal Government; (2) the current and future privacy concerns with any computer security legislation; (3) GAO's views on the proposed act; and (4) what can be done to further strengthen security program management at agencies. According to Rhodes, it is imperative that the Federal Government swiftly implement long-term solutions both at individual agencies and government wide to protect systems and sensitive data. He noted the need to protect sensitive data and systems must be weighed against cost and feasibility and privacy and security interests of citizens, private businesses as well as national security and law enforcement agencies. Without computer security, privacy cannot be assured. Without agreement among users, businesses, law enforcement, national security and other authorities on requirements, there is no way to implement new technology or to establish standards that will be universally accepted. Finally, Mr. Rhodes stated it is important to ensure NIST retains the ability to develop security standards for unclassified data and decide which industry standards are appropriate for federal agencies and the agencies consistently implement such standards.

Mr. Harris, testifying on behalf of the ITAA, stated his association and its members support the goals of H.R. 2413, to assist NIST in meeting the computer security needs of federal agencies and to allow the Federal government through NIST to harness the ingenuity of the private sector to help address its computer security needs. He noted computer security solutions should be industry-led. Mr. Harris recognized that great opportunities for collaboration between the Federal Government and private industry currently exist and there is a need for information security computer specialists and additional resources. Finally, Mr. Harris stated there is a need for authentication through digital signatures and a public key infrastructure.

Professor Trubow, testifying on behalf of the CSSPAB, warned that for the Board to remain effective, it should maintain its role as an advisory board. He noted it is appropriate for the Board to be asked for its advice and wisdom. In his opinion, the Board supports the goal of H.R. 2413 to expand NIST's activities in developing and promoting the use of information system security technologies. He noted attention to privacy must not be overlooked. Finally, Professor Trubow recommended that "privacy" be inserted in the bill in several areas.

4.5(w)—State of the States: Will Y2K Disrupt Essential Services?

October 6, 1999

Hearing Volume No. 106–56

Background

The Subcommittee on Technology and the Subcommittee on Government Management, Information, and Technology, Committee on Government Reform held a joint hearing entitled, "State of the States: Will Y2K Disrupt Essential Services?" The purpose of this hearing is to review the Y2K status of forty-three essential Federal programs that have a high impact on a great majority of Americans, most of which involve the participation of our Nation's fifty states. OMB identified forty-three "high impact" or essential federal programs including Medicare, the Nation's air traffic control system, food safety inspection, the weather system, public housing, and unemployment insurance. As of August 1999, however, only seven of forty-three (16 percent) of the programs were ready for the January 1, 2000 deadline. This number was very troubling. It appears as if the main reason for such a low level of Y2K readiness is that key supply chain partners, including state and local governments, and the private sector, were simply not yet ready. Especially troubling is the fact that ten of the forty-three essential programs are state administered programs that receive Federal funding. These programs include Medicaid, food stamps, child nutrition, child support enforcement, and temporary assistance for needy families. Not one of these state-administered programs was ready.

Witnesses included: Joel Willemssen, Director, U.S. General Accounting Office; John Spotila, Administrator, U.S. Office of Management and Budget, Office of Information and Regulatory Affairs; John Callahan, Chief Information Officer, U.S. Department of Health and Human Services; Shirley Watkins, Under Secretary U.S. Department of Agriculture, Food, Nutrition, and Consumer Services; and Mike Benzen, President, National Association of State Information Resources Executives.

Summary of hearing

Mr. Willemssen stated at particular risk are several states with systems not yet Y2K compliant. Federal agency reviews of business continuity and contingency plans for state-administered federal programs indicate many are inadequate—federal agencies are working with state partners to obtain readiness information and provide assistance. Some state completion dates are so close to the turn of the century that the risk of disruption to their programs is substantially increased, especially if unexpected problems arise.

Mr. Spotila said in the days remaining before the year 2000, they plan to complete work on remaining mission critical systems and on other federal systems, complete end-to-end testing with the states and other key partners, placing emphasis on programs that have direct impact on public health and safety and complete and test business continuity and contingency plans, particularly day one plans.

Mr. Callahan said all HHS mission critical systems are Y2K compliant, but was concerned about compliance status of some territories because their remediation effort may not be completed on time. State programs in Alabama, Delaware, DC, Georgia, Mississippi, New Hampshire and South Carolina have been assessed at high risk of Y2K failure because both remediation and testing of systems is not complete and there are underdeveloped contingency plans. A number of states lack completed Business Continuity and Contingency Plans (BCCP). Mr. Callahan stated HHS is providing direct technical assistance and help for remedial problems and there may be some Y2K compliant problems associated with Medicare and Medicaid providers.

Ms. Watkins said Food and Nutrition Service's (FNS) primary goal is to ensure no interruption in the Nation's nutrition assistance services (Food Stamp Program, Supplementary Nutrition Program for Women, Infants and Children (WIC), and Child Nutrition Program, includes school breakfast and lunch programs). A major concern of FNS is the ability of state partners to deliver program benefits as the new year begins. As of September 25, 1999, 139 of 162 state agencies that operate joint FNS/state agency programs reported they are Y2K compliant or would be by month's end. He intends to continue to work with the remaining 23 agencies. Ms. Watkins said there is a contractor working with the State of Georgia and compliance is expected by December and in Maryland there is a manual system in place for the School Nutrition program and no disruption in payments or serving of meals is expected.

Mr. Hugler said Unemployment Insurance (UI) program is a Federal-State partnership which serves approximately eight million unemployed workers and issues payments in excess of $20 billion and collects taxes of about $22 billion from 6.5 million employers annually. Currently, benefits, tax and wage records systems are Year 2000 compliant in forty-six State Employment Security Agencies (SESA) and benefit payment systems are compliant in all but three of the fifty-three jurisdictions. SESAs in the District of Columbia, Puerto Rico and California are planning to implement benefit systems during last quarter of 1999. All fifty-three SESAs have BCCPs in place for their benefit systems and New Jersey and Puerto Rico are working on contingency plans for their tax systems. BCCPs are currently under review in the Department. The Department has asked partners to develop specific plans, "Zero Day" and "Day One," for the period of December 30, 1999 to January 3, 2000, including additional steps the SESAs will take to reduce special risks to their systems.

Mr. Benzen reported in a survey conducted by NASIRE, thirthy-six NASIRE state members are now at least ninety percent complete with their remediation progress. According to the survey, forty-three NASIRE member systems are now at least 75 percent compliant (figure represents over ninety-four percent of Nation's population). States are scheduled to spend $3.5 billion overall on Y2K remediation.

4.5(x)—Y2K and Nuclear Power: Will Reactors React Responsibly?

October 26, 1999

Hearing Volume No. 106–55

Background

The Subcommittee on Technology and the Subcommittee on Government Management, Information, and Technology, Committee on Government Reform held a joint hearing entitled, "Y2K and Nuclear Power: Will Reactors React Responsibly?" The purpose of this hearing was to review the Y2K status of the nuclear energy industry, discuss the industry's readiness and contingency plans. In May 1998, the Technology Subcommittee held a hearing on the electric and energy industries. At the hearing, a number of concerns were raised about the nuclear industry. This hearing followed up on the concerns first raised at the hearing and provides an update on the industry's Y2K efforts.

Since the May 1998 hearing, the nuclear energy industry has been testing plant computers that control operations as well as safety. A number of plants undertook individual testing programs and utility companies have created a coordinated, industry-wide Y2K program of standardized guidelines and schedules for plant computer inspection and correction.

The industry-wide Y2K inspection of some 200,000 items revealed that only about 10,000 plant systems required Y2K fixes. As of October 1, 1999, the Nuclear Energy Institute (NEI) announced that ninety-six of the Nation's 103 operating nuclear power plants have stated they have completed all of the required Y2K remediation. NEI indicates the only obstacle to achieving 100 percent industry compliance are just nine computer systems that remain to be corrected at seven plants—none of which affect plant safety.

Witnesses included: Joel Willemssen, Director, Civil Agencies Information Systems, U.S. General Accounting Office, accompanied by Keith Rhodes, Director, Office of Computer and Information Technology Assessment, U.S. General Accounting Office; Frank Miraglia, Deputy Executive Director, Reactor Programs, U.S. Nuclear Regulatory Commission; and Ralph Beedle, Senior Vice President and Chief Nuclear Officer, Nuclear Energy Institute.

Summary of hearing

Mr. Willemsen and Mr. Rhodes indicated while progress has been made in making the Nation's nuclear power plants and fuel processing facilities Y2K ready, some risk remains. At particular risk are the seven plants that do not yet have their non-safety systems ready, especially the two with completion dates scheduled for more than 30 days from now, ever closer to the turn of the century. Similarly, the four nuclear fuel facilities that were not Y2K ready by September 1, 1999, raised concerns. Likewise, not knowing the current Y2K status of all 14 decommissioned plants with spent fuel also raises concern. Finally, the lack of information on two key issues—independent reviews of Y2K testing and emergency Y2K exercises—and the lack of requirements for Day One planning increases the Y2K risk to the nuclear power industry.

Mr. Miraglia said the NRC oversees the operation of all nuclear power plants in the United States. At every plant in the country, NRC has stationed resident inspectors who monitor their safety and operational systems. NRC resident inspectors are carefully monitoring Y2K preparations in addition to their regular oversight responsibilities. Also, specially trained NRC inspectors will conduct formal on-site reviews of Y2K progress at each plant. GAO stated to further reduce risks, NRC and the nuclear power industry can still take specific actions to ensure Y2K-related plant safety. First, NRC should evaluate and report on the Y2K status of all decommissioned plants with spent fuel status that previously reported they were not Y2K ready. Second, NRC should survey the 103 operational nuclear power plants to gain an understanding of what independent reviews were completed. Based on this information, NRC could then identify plants that may need additional reviews. Third, it should obtain information on the scope and extent of nuclear power plants' emergency exercises, and whether these exercises have incorporated Y2K scenarios. Finally, the NRC should ensure that all nuclear facilities have developed Day One plans.

Mr. Beedle stated, there are no Year 2000 safety problems at America's 103 nuclear reactors. The 20 percent of our Nation's electricity generated by nuclear power—enough electricity for 65 million homes—will not be jeopardized by Y2K. America can rely on electricity from nuclear energy—the greatest source of emission-free electricity—on New Year's Day 2000 and on into the new century. Beedle expressed confidence of all safety-related issues have been resolved and these baseload electric facilities will continue to substantially contribute to the stability of the nation's electricity power grid.

4.5(y)—Competing in the New Millenium: Challenges Facing Small Biotechnology Firms

October 27, 1999

Hearing Volume No. 106–50

Background

Biotechnology continues to hold great promise for the future. According to statistics compiled by the Biotechnology Industry Organization (BIO), over 200,000 million people worldwide have been treated by more than 80 biotechnology drug products and vaccines available on the market today. Beyond health care, biotechnology continues to change the way we grow food, protect the environment, and revolutionized criminal investigations through DNA technologies.

A majority of the 1,283 biotechnology firms in the United States are small businesses with nearly two-thirds employing fewer than 135 people. As a whole, the biotechnology industry continues to flourish. In 1998, the biotechnology industry generated revenues of $18.6 billion, up 16 percent from $16.1 billion in 1997. Despite the large number of small biotech firms and the economic growth in the industry overall, many analysts have expressed concern that small biotech firms have been entrenched in a period of recent economic downturn. This hearing focused on the challenges facing

small biotech firms and explored their ability to remain competitive in the flourishing biotechnology industry.

Witnesses included: Dr. John Holaday, President and CEO, EntreMed, Inc., Rockville, MD; Dr. Michael Horvath, Department of Economics, Stanford University, Stanford, CA; Mr. Dennis Purcell, Managing Director, Life Science, Hambrecht & Quist LLC, New York, NY; and Dr. Steven Niemi, President, Genetix Pharmaceuticals, Cambridge, MA.

Summary of hearing

Dr. Holaday testified one barrier facing biotech companies is the length of time needed to move a drug through the development process. He said on average only one in 5,000 discoveries results in an approved drug twelve years later, at a cost in excess of $350 million. Unlike large pharmaceutical companies, he stated small biotech companies have limited resources. To encourage greater investment in the biotech industry, Dr. Holaday advocated that those who take the risk of funding research and product development in biotechnology by purchasing shares in those companies should be allowed greater tax incentives. He finished his testimony by stating he believed there was a shortage of qualified scientists at the graduate and postgraduate levels to staff many biotech firms.

Dr. Horvath stated biotechnology firms would continue to face difficulty in obtaining venture financing relative to firms in the internet-related sectors for several years to come. He stated while small biotech firms were more limited in their ability to raise venture funds in 1996–97, more recent data suggested an increasing fraction of biotech venture capital is flowing in the form of smaller deals. He cautioned against increased federal funding for the biotech industry as a way to make up for lost revenue as investors flee toward the information technology industry. Instead, he said emphasis should be placed on removing any unnecessary uncertainty associated with regulation in the product markets that biotech firms are pursuing as a way to make investments in the biotechnology industry more attractive.

Mr. Purcell testified the number of drugs coming from the biotech industry would explode over the next few years. In addition, he stated the large biotech companies have been the real winners, with the top ten biotech companies rising in value almost 88 percent in 1998, whereas nearly 100 smaller biotech companies have less than one year of cash. He indicated at the current time, Wall Street favored bigger, more stable and more liquid companies. He said the major question becomes, can we make the smaller biotech industry a larger biotech industry and if we put two companies together, they'll actually be worth more than the sum of their parts.

Mr. Niemi described the process by which a small biotech company begins to raise venture capital. He also stated foreign countries have been increasingly more aggressive in pursuing or recruiting investment or acquisition or subsidiary expansion into various European countries. He testified there is more money currently going into the European biotech sector for various reasons.

4.5(z)—Y2K and Contingency and Day 1 Plans: If Computers Fail, What Will You Do?

October 29, 1999

Hearing Volume 106–54

4.5(aa)—Y2K Myths and Realities

November 4, 1999

Hearing Volume No. 106–61

Background

The Subcommittee on Technology and the Subcommittee on Government Management, Information, and Technology, Committee on Government Reform held a joint hearing entitled, "Y2K Myths and Realities: Responding to the Questions of the American Public with 50 Days Remaining Until January 1, 2000." With the Congressional adjournment of the first session of the 106th Congress, this hearing was the final hearing of the House Y2K Working Group before the January 1, 2000 Y2K deadline. The purpose of this hearing is to discuss and respond to Y2K questions raised by the American public relating to issues such as our nation's preparedness, investor confidence, Y2K hype and marketing, and health concerns, among a host of others. The objectives were: to examine questions posed by Americans on how they should prepare for any potential Y2K disruptions; to discuss the status of federal and private Y2K efforts and their contingency plans; to determine the federal strategy on January 1, 2000; to review the impact of Y2K on investor confidence; to explore the media impact and potential hype leading up to the January 1, 2000 deadline; to respond to Y2K concerns affecting hospitals and the medical community; and to inquire upon other related Y2K issues.

Witnesses included: John A. Koskinen, Special Assistant to the President, Chairman, Y2K Conversion Council; Joel Willemssen, Director of Civilian Agencies Information Systems, United States General Accounting Office; J. Patrick Campbell, Chief Operating Officer and Executive Vice President, The Nasdaq-Amex Market Group, Inc.; Barry F. Scher, Vice President of Public Affairs, Giant Food, Inc.; and Ronald Margolis, representing the American Hospital Association, Chief Information Officer, University of New Mexico Hospital, Health Sciences Center.

Summary of hearing

Mr. Koskinen said the Council's information coordination center or (ICC) will be the Federal Government's central point for coordinating information on systems operations and events related to the Y2K transition that will be collected by government emergency centers in the private sector. Information gathered by the ICC will be the basis for national and international status reports that will be provided to all Federal agencies and organizations sharing information with the center. Status reports will be provided to Congress and to the public. Suggestions from the ICC include having at least a three day supply of food and water, keep copies of important fi-

nancial records before and after January 1, 2000 and check with manufacturers to make sure that home electronic equipment is Y2K ready.

Mr. Willemssen stated among the areas most at risk are health care (Medicare, Medicaid and biomedical equipment) and education (many school districts and post secondary institutions are not yet compliant). Agencies that need to be monitored closely because of the criticality of information systems to their missions include the Health Care Financing Administration, DOD, FAA and IRS.

Mr. Sher stated in anticipation of peaks in consumer demands for certain products, Giant is developing specific merchandising plans which include buying and distribution strategies and an internal and external communications plan with the objective to inform and educate a number of stake holders about their Y2K readiness.

Mr. Campbell stated they are confident there will be no serious disruptions in service and markets and investors will be protected. In addition to systems testing, extensive contingency plans have been made and NASD has established corporate and business line command centers that will operate from late December through the first week in January 2000. Centers will be linked to SEC and other industry organizations. NASD has focused on investor education.

Mr. Margolis said in a survey conducted last Spring, 95 percent of hospitals expected their medical devices, computerized information systems and infrastructure would be Y2K compliant.

Chairwoman Morella asked about the criticism from the Y2K community that the government is overly optimistic in its assessments and Mr. Koskinen replied there is a small minority of people who think that and none have any evidence that disputes surveys that have been presented. We have an obligation to the public to provide all the information we have—good information and areas that are troublesome. Congressman Ose expressed his appreciation to Mr. Koskinen and Mr. Willemssen and urged those who plan to travel over the millennium weekend visit the FAA website, fly2k.gov. Congresswoman Biggert asked about dispelling rumors about Y2K and Mr. Koskinen replied his goal in life is to have the American public feel they know everything he knows and can then decide how to respond appropriately. Chairman Horn and Mr. Koskinen discussed the progress made in the educational institutions and a third of them are not prepared at this time—both higher education and elementary and secondary. Mr. Koskinen said they need to keep working on remediation, on testing, re-testing and on contingency plans. Congressman Turner asked about ensuring we have a response system in place and Mr. Willemssen stated the Information Coordination Center has a press briefing room and press briefings are planned every four hours during the roll-over period. Mr. Campbell said similar plans are in place for the securities industry.

4.5(bb)—The Year 2000 Computer Problem: Did the World Overreact, and What Did We Learn?

January 27, 2000

Hearing Volume No. 106–84

Background

On January 21, 2000, the Subcommittee on Technology held a hearing entitled, "Year 2000 Computer Problem: Did the World Overreact and What Did We Learn?" The hearing was held to present the results of the Y2K computer problem and to look at the lessons learned from the whole experience. Additionally, we evaluated the Y2K glitches that did occur and examined how they could have been prevented.

Witnesses Included: The Honorable John Koskinen, Special Assistant to the President, Chairman of the President's Council on Year 2000 Conversion; Mr. Joel C. Willemssen, Director, Civil Agencies Information System, General Accounting Office; The Honorable Charles Rossotti, Commissioner, Internal Revenue Service; Mr. Fernando Burbano, Chief Information Officer, Department of State; Mr. Harris Miller, President, Information Technology Association of America; Ms. Cathy Hotka, Vice President for Information Technology, National Retail Federation; and Mr. Gary Beach, Publisher, CIO Communications, Inc.

Summary of hearing

The Honorable John Koskinen testifying as the Special Assistant to the President, Chairman of the President's Council on Year 2000 Conversion, testified the Y2K problem was the greatest management challenge the world has faced in the last 50 years. However, in trying to make the transition as smooth as possible, the problems that did occur did not have a noticeable impact on the general public. Contingency plans and knowledge of IT systems proved to be an immense help in preparing for Y2K. The plans have also helped organizations take a deeper look at their existing technology and the functions they perform. Y2K transition was seamless due to both the partnerships that were formed across traditional boundaries as well as the involvement of the American public.

Mr. Joel C. Willemssen, Director, Civil Agencies Information Systems, U.S. General Accounting Office, stated while some Year 2000 problems did occur, all of them have been fixed, and the transition was relatively smooth. Some of the major lessons learned were the importance of providing high-level congressional and executive branch leadership, providing standards guidance, and implementing fundamental information technology improvements. He goes on to add that organizations should keep moving forward and use all of the information gained from this experience to help target and solve problems in the future.

The Honorable Charles Rossotti, testifying as Commissioner of the Internal Revenue Service, testified he was gratified with the successful Y2K conversion program. However, if the IRS had not taken the proper steps in ensuring Y2K readiness, major disruptions could have been a result. For the IRS the Y2K scare could

have been a blessing in disguise. Not only was the IRS ready, but they have gained improved program management practices, upgraded hardware and software products and standardization of products. Likewise, these benefits will only be recognized if they use the practices established during Y2K.

Mr. Fernando Burbano, Chief Information Officer, Department of State, stated the Federal Government did not spend too much in trying to prepare itself for the Y2K bug. Senior level leadership was critical to a successful rollover. Furthermore, giving agencies separate funding to remediate any Y2K problems was essential. He goes on to add that by providing beneficial benchmarks, agencies and the Federal Government were able to quickly assess the current status of readiness and see how they measured up to federal milestones. The CIO was able to have a congressionally managed, yet continuous stream of funding specially designed for Y2K. This enabled federal CIOs and Y2K program managers to acquire and retain qualified resources in the needed quantity. Congressional support and the ability to gain access to separate supplemental CIP and security funding is vital in keeping Critical Infrastructure Protection goals.

Mr. Harris Miller the President of Information Technology Association of America, testified the Y2K transition was successful because so many people put in time and energy to ensure Y2K did not disrupt our normal lives. It also began to bring to light how dependant we are on IT systems. Y2K gave users a better understanding of the uses and capabilities of IT. Immense collaboration and planning was used to make Y2K a success. Mr. Miller adds that this momentum should be used to ensure that the digital era does not leave the "have nots" behind.

Ms. Cathy Hotka, Vice President for Information Technology, National Retail Federation, stated the retail industry fared better than expected in the Y2K rollover. Without Y2K testing, 100% of private label credit cards and 99% of warehouse management systems would have failed. Retailers have learned through Y2K how dependent they are on IT. Major functions were being carried out on fifteen-year-old systems. She went on to add that reliable information was hard to come by and the government's involvement was needed to shed light on the importance of this issue.

Mr. Gary Beach, Publisher, CIO Communications, Inc., stated the global Y2K remediation experience has helped everyone understand the impact of technology on businesses in our lives. He contends Y2K has forced organizations to modernize. He commended the world's IT workers and hopes technology continues to bring us all together. He reminds us not to forget those unable to afford such technology.

4.5(cc)—R&D to Improve Aviation Safety and Efficiency: A Review of the FAA FY 2001 Funding Request for R&D

March 1, 2000

Hearing Volume No. 106–68

Background

On March 1, 2000 the Subcommittee on Technology held a hearing entitled, "R&D to Improve Aviation Safety and Efficiency: A Review of the FAA FY 2001 Funding Request for R&D," to receive testimony regarding the review of the Federal Aviation Administration (FAA) research and development budget request for Fiscal Year (FY) 2001. This includes the Research, Engineering and Development (RE&D) account and certain other activities.

Witnesses included: Mr. Steven Zaidman, Associate Administrator for Research and Acquisitions; Ms. Alexis M. Stefani, Assistant Inspector General for Auditing; Mr. Robert E. Doll, Chairman, FAA RE&D Advisory Committee; Mr. Jack Clemons, Senior Vice President, Lockheed Martin Air Traffic Management.

Summary of hearing

Mr. Steven Zaidman, testifying as Associate Administrator for Research and Acquisitions, testified the national airspace system is in constant battle to keep up with the rising demands of air traffic. Yearly, 600 million passengers choose to fly within U.S. airspace, however this number is growing, and by the end of this decade over one billion people will be flying. In order to sustain this level of activity, the FAA must be able to, "employ new technologies and procedures to increase efficiency as traffic grows."

Furthermore, Zaidman adds new security threats are forcing the FAA to produce highly sophisticated equipment to combat the problem of cyberterrorism. Proposed R&D investments for FY 2001 will delegate $5.5 million to fund cyberattacks and other malicious agents. Zaidman later claimed partnerships have also helped immensely. Data can be shared and analyzed to identify root causes of aviation safety incidents to prevent future problems from occurring. Collaboration with the Department of Defense and NASA has paved the way for R&D research in the area of aging aircrafts, aging aircraft systems, aviation system capacity and efficiency, and aircraft noise and emissions reduction.

Ms. Alexis M. Stefani, Assistant Inspector General for Auditing, stated the FAA is requesting $184 million for RE&D funding in Fiscal Year 2001. This is an increase of almost 18 percent. Some reasons for this rise in funding are the changes in the nature of the FAA's research and development efforts and how these efforts are financed. In addition, government-wide cooperation and coordination on aviation research between the FAA and NASA has helped to improve the margin of safety and efficiency of the National Airspace System. While creating the FAA's Free Flight Initiative, it became evident that technology transfer between the two organizations required more attention. Another area of concern was the human factor, which was brought to light in the research and development of new technology. Areas of concern were the impact

on selection and training of controllers to work technologically-advanced equipment and the impact on pilots of new data link communications and cockpit display technology. Finally, the FAA is actively working on aircraft safety research. They are requesting $4.8 million for non-structural aging aircraft work, which includes wiring, hydraulics, and mechanical systems.

Mr. Robert E. Doll, testifying as Chairman of the FAA RE&D Advisory Committee, stated he supports the FAA's request for $257.4 funding for RE&D in FY 2001. All funds allocated in FY 2001 are aimed at solving problems that might impact the system within the next five years. He contends the surge in air traffic must be addressed, and furthermore Air Traffic Management is in everyone's interest. Since technology is advancing so quickly, the FAA is having problems adopting and implementing these programs. The REDAC also supports the partnership between the FAA and NASA in forming a "Blue Ribbon Group." The group would solicit and synthesize the views of all stakeholders in the aviation industry.

Mr. Jack Clemons, Senior Vice President of Lockheed Martin Air Traffic Management, testified about the importance of leveraging partnership with industry, the need for sustained and sufficient funding and the need for specific areas of focus. He added Lockheed Martin Air Traffic Management has invested their own money in R&D research of advanced technology. These self-funded initiatives have uncovered the need for sustained and sufficient funding to allow adequate lead-time in understanding potential problems. In closing, he discussed the shortage of highly skilled technological labor. Mr. Clemons claimed telecommunications technology was under-represented in the R&D focus. As the FAA moves towards Free Flight, this area of communications will become even more important. He stated if the Subcommittee authorized R&D funds specifically for hardening telecommunications technologies and implementing them into the demands of the FAA, everyone would benefit.

4.5(dd)—Review of the FY 2001 Budget Request for the Technology Administration/National Institute of Standards and Technology Including Computer Security and E-Commerce Initiatives

March 9, 2000

Hearing Volume No. 106–71

Background

On March 9, 2000 the Subcommittee on Technology held a hearing entitled, "Review of the FY2001 Budget Request for the Technology Administration/National Institute of Standards and Technology Including Computer Security and E-Commerce Initiatives," The hearing reviewed the FY 2001 Budget Request for the Technology Administration and the National Institute of Standards and Technology (NIST). In particular, the hearing focused on new initiatives in the area of computer security and e-commerce.

Witnesses included: The Honorable Cheryl Shavers, Under Secretary for the Technology Administration, United States Department of Commerce; The Honorable Raymond Kammer, Director,

National Institute of Standards and Technology; The Honorable Johnnie E. Frazier, Acting Inspector General, U.S. Department of Commerce.

Summary of hearing

The Honorable Cheryl Shavers, testifying as the Under Secretary for Technology, testified innovation continues to lead the way for economic expansion in the U.S. Despite this ongoing change, the Technology Administration plans to play a leading role in helping America's economy continue to move forward and remain competitive. The Technology Administration has requested almost $722 million with a majority of that going to the National Institute of Standards and Technology.

One of NIST's FY 2001 budget initiatives proposes new funding for the acceleration of electronic commerce. This will allow the Manufacturing Extension Program (MEP) to work with the U. S. Department of Agriculture and the Small Business Administration to create an outreach program. The MEP will also create, distribute and produce e-commerce Jump-Start Kits to help train and test the adoption of e-commerce.

The Technology Administration also hopes to broaden the Cooperative Research and Development Agreements (CRADAs). TA will use the additional funding to expand the breadth and depth of its reporting on agency technology transfer activities. In addition, the Partnership for a New Generation of Vehicles (PNGV) seeks to use additional funding to assess the impact of technologies on the automotive supplier base, in conjunction with interested stakeholders as well as with state and regional economies.

The Honorable Ray Kammer, testifying as the Director of National Institute of Standards and Technology (NIST) stated in the Administration's FY 2001 budget to Congress includes $713 million for NIST. This is an increase of about 12% over its FY 2000 budget of $636 million.

Included in the FY 2001 budget request is $337 million for Scientific and Technical Research and Service, and $5 million for the Baldridge National Quality Program (BNQP), and $339 million for the Industrial Technology Service, which includes $175 million for funding of the Advanced Technology Program (ATP). NIST also hopes to upgrade the safety of their facilities and thus proposed $36 million for the construction, critical repair and maintenance.

The Honorable Johnnie E. Frazier, Inspector General, U.S. Department of Commerce, stated since he last testified before the Committee, NIST has been monitoring its capital improvement facilities plan. He goes on to add that NIST has failed in some situations to justify its new and updated plans. Five discretionary grant programs have been completed and four final reports have been submitted, all in compliance with Commerce and federal guidelines. Mr. Frazier adds that the fate of NIST is still in question. The agency has suffered a decline in sales of their products and services.

The Technology Administration is faced with the challenge of implementing the Government Performance and Results Act. This is due to the difficulty of measuring the benefits of investments of scientific research in the long term. Another challenge TA faces is the

implementation of the Commerce Administration Management System (CAMS). Mr. Frazier concluded his presentation by adding that proper management is needed to minimize delays, disruptions and costs.

4.5(ee)—Standards Conformity and the Federal Government: A Review of Section 12 of Public Law: 104–113

March 15, 2000

Hearing Volume No. 106–72

Background

On March 15, 2000 the Subcommittee on Technology held a hearing entitled, ''Standards Conformity and the Federal Government: A Review of Section 12 of Public Law: 104–113. ''This hearing focused on the implementation of Section 12 of the National Technology Transfer and Advancement Act of 1995 (Public Law: 104–113) among the federal agencies and departments. In addition, this hearing examined the effectiveness of the National Institute of Standards and Technology (NIST) in its coordinating role under the Act.

Witnesses included: Mr. Jim Wells, Director, Energy, Resources and Science Issues, U.S. General Accounting Office; Dr. Belinda Collins, Director, Office of Standards Services, National Institute of Standards and Technology; Mr. Gregory E. Saunders, Director, Defense Standardization Program Office, Department of Defense; Mr. Richard L. Black, Director, Office of Nuclear Safety Policy and Standards, Department of Energy.

Summary of hearing

Mr. Jim Wells, testifying as the Director, Energy, Resources and Science Issues, U.S. General Accounting Office, testified the National Institute of Standards and Technology (NIST) and the Office of the Office of Management and Budget (OMB) have been taking steps to guide and coordinate federal agencies towards using voluntary consensus standards. He also claimed NIST is chairing an interagency committee directing an internal advisory committee to create a strategic approach to setting standards for other agencies to follow. He later adds the reporting from the agencies has not been very successful. The 1998 report was submitted 18 months late, and the 1999 report is still outstanding. One of the factors contributing to the delay is there is not a definitive list of the agencies that should be reporting. He did state the Department of Defense and the Environmental Protection Agency are among the few that have been complying with the Act.

Dr. Belinda Collins, Director, Office of Standards and Services, National Institute of Standards and Technology, elaborated on NIST's role in the implementation of the National Technology Transfer and Advancement Act. She claimed NIST has been encouraging the agencies to implement their own standards management program to leverage the efforts of the Interagency Committee on Standards Policy (ICSP). Similarly, NIST has been working with other federal agencies and the private sector to build a national infrastructure, the National Cooperation for Laboratory In-

frastructure. This infrastructure would make progress toward resolving problems of duplication and costly accreditation that do nothing to help to the value of the Act. NIST has also helped other federal agencies in standards and conformity assessment procedures.

Mr. Richard L. Black, testifying as the Director, Nuclear Safety Policy and Standards, Office of Environment, Safety and Health, and Department of Energy Standards Executive, Department of Energy testified standards are used differently in the Department of Energy. They are used to design, build and operate nuclear facilities, and the Department's concerns lie within safety and procurement standards. However, since the Act, standard issues are being shared, and there is a better coordination process between the international and national standard setting organizations. Mr. Black also claimed there has been a decline in participation from 1997–1999. Participants fell from 870 to 200. This was due to a decline in the budget. Furthermore, help from standards-setting organizations gets standards implemented faster, better and cheaper in the Federal Government.

Mr. Gregory E. Saunders, Director, Defense Standardization Program Office, Defense Logistics Agency, stated the Department of Defense has implemented the intent of the National Technology Transfer and Advancement Act. Mr. Saunders acknowledged Federal Government entities should participate and adopt voluntary standards. Since the Act has been signed into law in 1996, the DOD has adopted 7,400 voluntary standards. The DOD has also put in place a stringent system to review requirements for documents to determine whether a voluntary standard would be appropriate. Their main goal in implementing standards is to save taxpayer dollars, improve performance, quality, safety and reliability of products. Even so, the DOD has experienced a decline in participants in using voluntary standards. Much of the decline is due to the reduced numbers of technical personnel and reduction in the budget. In closing Mr. Saunders stressed that the DOD supports the Act and hope to continue its tradition of being at the forefront of standards development.

4.5(ff)—The Changing Face of Healthcare in the Electronic Age

March 30, 2000

Hearing Volume No. 106–73

Background

On March 30, 2000 the Subcommittee on Technology held a hearing entitled, ''The Changing Face of Healthcare in the Electronic Age.'' The purpose of this hearing was to examine the impact of emerging information technologies (IT) on the management, administration, and delivery of healthcare. The hearing also looked at the barriers to integrating IT into the healthcare industry as well as the role of the Federal Government in developing both standards and security measures that will assist the healthcare industry in implementing quality IT strategies.

Witnesses included: The Honorable Ray Kammer, Director, National Institute of Standards and Technology; Dr. Lewis Lorton,

Administrator, Forum on Privacy and Security in Healthcare; Mr. Greg Hedges, Lead Partner, Technology Risk Consulting, Arthur Anderson, LLP; Mr. Jeff Hodge, Vice President, DataCert.Com.

Summary of hearing

The Honorable Ray Kammer, testifying as the Director, National Institute of Standards and Technology, testified in 1998, medical spending exceeded $1.1 trillion dollars, of which, 20 percent is spent on administrative processing. One initiative NIST has undertaken to evaluate information technology security is the development of the Common Criteria. This standard is the basis for specifying and testing the security features of a wide range of technologies. NIST is also developing public key cryptographic techniques to ensure confidentiality of patient information transmitted over the Internet, otherwise known as Public Key Infrastructure. Through their Advanced Technology Program (ATP), NIST has cofounded 32 projects with about $140 million of ATP funding and $140 million of private sector funding.

Dr. Lewis Lorton, Administrator, for the Forum on Privacy and Security in Healthcare, stated the government has to help in securing the healthcare industry. He went on to add there are about 50,000 organizations in the healthcare industry and roughly fifteen million people who handle healthcare information. There are virtually no technology regulations and standards. He later added the public deserve assurance their information will be kept private. Since the industry is so diverse in size, this assurance has to be able to cover even the smallest of practices. Dr. Lorton recommends an independent certification process to ensure standards are set and met. He believes NIST and other agencies have the ability to provide this type of service. He believes the government will be able to save consumers millions of dollars while providing the security and privacy they deserve.

Mr. Greg Hedges, Lead Partner, Technology Risk Consulting, Arthur Andersen, LLP, testified the trust of the American people is at stake as more and more organizations take on and use the Internet. He goes on to state health care providers must be accountable for the prescriptions they write and diagnoses they make. Standards must be made within the industry and definitions of what is acceptable must be made. Mr. Hedges also adds there must be trust between the two parties sharing information. He later claims that the bridge between standards and implementation must be filled in order to achieve security and confidentiality.

Mr. Jeff Hodge, Vice President for Healthcare, DataCert.com, testified they are aware of the complexity involved in making information secure. Mr. Hodge contends even though passing important legislation is imperative, the government faces the challenge of enacting an administrator's health care privacy law to provide structure and guidance without hindering development and competition. He firmly believes the government should further Public Key Infrastructure (PKI) bridging approaches and implement it into a separate but connected encryption. PKI and PKI bridging would facilitate the free flow of information securely between disparate healthcare players. He goes on to state standardization is the most efficient and effective way to drive down control and the cost asso-

ciated with technology. The government should support scaleable approaches to securing information and they should reject the use of proprietary technologies and application approaches.

4.5(gg)—Wireless Internet Technology

April 13, 2000

Hearing Volume No. 106–75

Background

On April 13, 2000 the Subcommittee on Technology held a hearing entitled, "Wireless Internet Technology." This hearing examined the future of wireless Internet technologies. It was intended to provide background to members on wireless Internet technologies as they currently exist and will develop in the near future. Also, this hearing discussed the important role of standards in developing a wireless Internet.

Witnesses included: Dr. Irwin M. Jacobs, CEO, QUALCOMM Inc.; Richard J. Lynch, Executive Vice President and Chief Technology Officer, Verizon Wireless; Timothy R. Graham, General Counsel and Executive Vice President, Member of Board of Directors, Winstar Communications, Inc.; Paul Fulton, Vice President and General Manager, Wireless Division, 3Com Corporation.

Summary of hearing

Dr. Irwin M. Jacobs, CEO, QUALCOMM Inc., testified the communications industry is growing rapidly. He estimates within the next two years there will be one billion mobile phone subscribers worldwide. Dr. Jacobs described how wireless phones will soon act as browsers and give access to the Internet. He adds that QUALCOMM has been active in creating CDMA, Codivision Multiple Access. This technology is used in 35 countries with 50 million subscribers. CDMA will also be involved with the development of Third Generation Internet. Dr. Jacobs contends standards for Third Generation Internet have also been set and he referred to it as 1X Multicarrier (MC). MC uses the same bandwidth carrier as radio signals and QUALCOMM voice communications. 1X Multicarrier also supports higher data rates of up to 300 kilobits per second. Another development Qualcomm demonstrated through CDMA is 1X HDR, High Data Rate, which supports 2.4 megabits again on the same radio bandwidth. Dr. Jacobs asserts this technology will bring wireless Internet access to rural areas and other areas that do not have access. He stressed since this technology is all wireless, it can be installed quickly and at low cost. He showed a movie displaying how mobile wireless technology worked and the capabilities of CDMA.

Mr. Richard J. Lynch, Executive Vice President and Chief Technology Officer, Verizon Wireless, stated the importance of harmonizing standards in wireless communications. Verizon has chosen to use CDMA technology and is implementing it into all of their new systems. Mr. Lynch added that Verizon currently sells CDMA data enabled phones, however they are focusing on providing a more efficient wireless Internet service that will provide 144-kilobit data rate. Verizon is conducting field trials with infrastructure ven-

dors and will have commercial availability of 1XRTT in the first half of 2001. In addition, Verizon plans to market services that will provide 2-megabit data rate in 2001. Mr. Lynch cited the availability of both advanced technology and applications support as factors that are important in the success of the wireless Internet industry. Finally, Mr. Lynch stresses the importance of an available spectrum to run the high data speed technology. He urged Congress to recognize the need to eliminate spectrum caps and other restrictive ownership to allow wireless Internet to flourish.

Mr. Timothy R. Graham, Executive Vice President and General Counsel, Winstar Communications, testified Winstar is the largest holder of fixed spectrum in the United States. Their company intent has been to build a facility based on broad band network from the ground up. The company is aimed at helping small and medium-sized companies connect to the Internet and broad band communications. Mr. Graham discussed how fixed wireless networks are set up and how they work. He later stressed the importance of having flexible policies in spectrum allocations and how flexibility encourages the development of wireless Internet. Winstar's greatest hurdle is gaining timely access to buildings where customers work. Mr. Graham adds that this supports the digital divide and creates a situation of the haves and have-nots.

Mr. Paul Fulton, Vice President and General Manager, 3Com Corporation, Wireless Connectivity Division stated the 3Com Corporation is a global networking technology company with $6 billion dollars in annual sales with 181 offices in 49 countries. Mr. Fulton claims 3Com is a leading provider of wired equipment for computer networks. 3Com is currently creating a high-speed in-building wireless network. 3Com asserts this technology will allow consumers to inexpensively deploy flexible computer networks and provide connectivity without installation fees. The wireless LAN technology was made possible by standards set in the private sector. Mr. Fulton discussed the need to let industry set standards and for the FCC and other government agencies to be careful not to undermine the private standard setting process.

4.5(hh)—The Love Bug Virus: Protecting Lovesick Computers from Malicious Attack

May 10, 2000

Hearing Volume No. 106–76

Background

On May 10, 2000 the Subcommittee on Technology held a hearing entitled, "The Love Bug Virus: Protecting Lovesick Computers from Malicious Attack." The hearing examined the features of the "love bug" computer virus, explored its impact on the Federal Government and the private sector, and examined possible solutions and preventative actions individuals and organizations should take to prevent emerging threats from impacting information technology systems and networks.

Witnesses included: Mr. Keith Rhodes, Technical Director, Office of the Chief Scientist, U.S. General Accounting Office; Mr. Harris Miller, President, Information Technology Association of America;

Ms. Sandra England, Senior Vice President, McAfee—A Network Associates Company; Mr. Peter Tippett, Chief Technology Officer, ICSA.net.

Summary of hearing

Mr. Keith Rhodes, Technical Director, Office of the Chief Scientist, stated the world does not practice safe computing. He described how the "I Love You" virus worked. He noted there were fourteen variances of this virus, some of which were even more damaging than the Love Bug. The Love Bug hit many large corporations such as AT&T, TWA, Ford and the Washington Post, ABC News, British Parliament, the IMF and at least fourteen other U.S. Government agencies. These viruses are spreading faster due to the high dependency on our network systems. Mr. Rhodes claims there is no silver bullet that will stop the infection of viruses. Therefore, agencies inside and outside the government must increase awareness, ensure existing controls are operating effectively, ensure software patches are brought up to date, use automated scanning and testing tools to quickly identify problems and be sure common vulnerabilities are addressed.

Mr. Harris Miller, President, testifying as Information Technology Association of America, testified cybercrimes are given less priority to other types of crime since there is no actual physical violence. This attitude must change, and the government agencies need to make information security a much higher priority. He stated information sharing is the key challenge. He is working to create an information-sharing mechanism with over 100 IT companies. ITAA will host the first global security summit in Washington, D.C. on October 16 and 17. He hopes to establish that same type of international collaboration that existed with the Y2K bug. ITAA is also working with the Department of Justice on the Cybercitizen Partnership to help promote cyberethics. He closes by stating cybercrime must not become an accepted practice.

Ms. Sandra England, Senior Vice President, McAfee—A Network Associates Company, testified the McAfee's Emergency response team, AVERT, immediately responded to the outbreak of the "I Love You" virus. They were able to dispense a cure within a couple hours of its first detection. She went on to add many viruses are detected on a daily basis. She cited last year alone there were $12 billion in damages due to various viruses. Ms. England claims even though viruses are attacking more frequently, not much is being done in the way of internal policies to respond to these new attacks. The actual cost from the viruses is hard to assess mainly since it is a loss of time and productivity. The anti-virus companies alone cannot combat this problem. Anti-virus software must be kept up to date, and signature files must be updated faithfully. She agreed more must be done to stop virus writers, and in turn stiffer punishments must be enacted.

Mr. Peter Tippett, Chief Technology Officer, ICSA.net discussed the costs and risks associated with electronic, malicious code, privacy, down time, physical and human related factors. He described ICSA as a new breed of Internet company that provides security assurances services. Mr. Tippett states every product that ICSA certifies can detect, prevent, and recover from every virus that has

ever been promulgated. However, after these products are installed into companies' systems they become only 30% effective. He suggests better education on how to use such software. He agreed with the other witnesses in stating stiffer laws must be invoked on those who choose to write these malicious codes. ICSA estimates that 65% of Northern American companies were infected as well as 133,000 desk-tops. In addition, they estimated damages to be between $325,000- $950,000 million dollars.

4.5(ii)—Technology Transfer Challenges and Partnerships: A Review of the Department of Commerce's Biennial Report on Technology Transfer

May 23, 2000

Hearing Volume Number 106–77

Background

On May 23, 2000 the Subcommittee on Technology held a hearing entitled, "Technology Transfer Challenges and Partnerships: A Review of the Department of Commerce's Biennial Report on Technology Transfer." The hearing discussed the effectiveness of our federal technology transfer laws and methods in which they may be improved.

Witnesses included: Ms. Kelly Carnes, Assistant Secretary for Technology Policy, Technology Administration, Department of Commerce; Dr. Randolph Guschl, Director, Corporate Technology Transfer & Education, DuPont Company; Mrs. Shirley Arnowitz, Senior Vice President, BioSpace International.

Summary of hearing

Ms. Kelly Carnes, testifying as Assistant Secretary for the Technology Policy, Department of Commerce, praised the Technology Subcommittee for its leadership and support in the area of federal technology transfer. She discussed the report "Technology Transfer 2000 Making Partnerships Work." Included in the report were: (1) claims tech transfer is a widely accepted practice of getting valuable information from federal laboratories; (2) technology transfer did not necessarily lead to an increase in the number of inventions; (3) licensing has become an increasingly important activity for laboratories; (4) income from the invention patent licenses by federal agencies has sharply increased. She added that looking at licensing revenue as a measure for success is a mistake. Furthermore, the number of partnerships some agencies have formed with industry has reached a saturation point. Some of the challenges facing technology transfer are companies are still having a difficult time finding the right federal laboratory. In addition, intellectual property management must become a top agency priority.

Dr. Randolph Guschl, Director, Corporate Technology Transfer & Education, DuPont Company, claimed he was speaking on behalf of the Industrial Research Institute (IRI). He agreed with the report and thinks it appropriately reflects the overall success the legislation has created. He added manufacturing requirements need to be changed, and details surrounding indemnification and IT rights could be simplified. However, this effort must include the right peo-

ple on both sides of the negotiations regarding technology transfer and IT rights.

Mrs. Shirley Arnowitz, Senior Vice President, BioSpace International, testified BioSpace has been a National Institute of Standards and Technology industry partner in the CRADA program since March 1998. BioSpace was created in 1997 with funding from Small Business Innovative Research (SBIR) awards from NASA, NIH and Investments from principals. She discussed her various partnerships with scientists from the NIST laboratories to help promote their, "Dynamically Controlled Crystallization System (DCCS)." Furthermore, in just two years DCCS has become "cutting edge technology." BioSpace has since moved into a 2000 square foot building located in Gaithersburg, Maryland and has also hired a part-time crystallographer from NIH to help with their commercial development. Mrs. Arnowitz suggested small companies in biotechnology should take advantage of the CRADA program.

4.5(jj)—E-Commerce: A Review of Standards and Technology to Support Interoperability

June 22, 2000

Hearing Volume No. 106–78

Background

On June 22, 2000 the Subcommittee on Technology held a hearing entitled, "E-Commerce: A Review of Standards and Technology to Support Interoperability." This hearing examined the impact of standards and emerging technologies that support electronic commerce.

Witnesses included: Dr. Karen Brown, Deputy Director, National Institute of Standards and Technology, Gaithersburg, MD; Mr. Keith Krach, Chief Executive Officer and Chairman of the Board, Ariba, Inc., Mountain View, CA; Mr. Ken Baker, President, ERIM, Ann Arbor, MI.

Summary of hearing

Dr. Karen Brown, Deputy Director, National Institute of Standards and Technology, discussed NIST's role in e-commerce, which is to work closely with the private sector and to provide tools such as: measurements and standards for the hardware, software and networks that comprise the e-commerce infrastructure; direct hands-on assistance through MEP to U.S. small manufactures who need help to thrive in the e-commerce economy; and co-funding private sector research through the ATP to develop new technologies that will enable future advances in the e-commerce infrastructure. NIST is leading the global effort to develop the Advanced Encryption Standard, which will be used to ensure encrypted sensitive material cannot be decoded by anyone but the intended parties. They are also helping to develop Public Key Infrastructure (PKI) standards that ensure accurate identification of the parties in an Internet transaction. Dr. Brown stated NIST has proposed a FY 2001 e-commerce initiative with three components: MEP E-commerce outreach ($9 million plus $6 million reprogramming, totaling

$15 million), Manufacturing Interoperability ($4 million), and Wireless Technologies ($1 million).

Mr. Keith Krach, Chief Executive Officer and Chairman of the Board, Ariba Inc., stated business to business e-commerce spending is necessary spending, not discretionary. It enables small companies to leverage the Internet economy by giving them a chance to work with larger businesses that they might have never encountered. Furthermore, Mr. Krach believes that the Federal Government could support business to business e-commerce by becoming a broad user of e-commerce and derive many of the same benefits from it that businesses do. In closing, Mr. Krach believes government's information technology spending should be directed towards implementing the infrastructure that will enable the government to participate in the business to business marketplace.

Mr. Ken Baker, President, ERIM, testified the problem of interoperability in the U.S. industrial supply chain costs American automotive industry more than $1 billion each year. ERIM's center for Electronic Commerce has been working on interoperability issues for over 10 years. They have also worked with the Automotive Industry Action Group (AIAG) and NIST to conduct pilots to improve the quality and timeliness of data exchange among current automotive manufactures and their suppliers. Mr. Baker adds the industry lacks the third party leadership to reach common agreement on standards.

4.5(kk)—A Review of the Morella Commission Report: Recommendations to Attract More Women and Minorities into Science, Engineering, And Technology

July 13, 2000

Hearing Volume No. 106–83

Background

On July 13, 2000 the Subcommittee on Technology held a hearing entitled, ''A Review of the Morella Commission Report: Recommendations to Attract More Women and Minorities into Science, Engineering, and Technology.'' This hearing examined the importance of fostering a high-tech workforce capable of competing in the 21st century and to explore the factors contributing to the underrepresentation of women and minorities in the science, engineering, and technology disciplines. The hearing also reviewed the recommendations put forth by the Commission on the Advancement of Woman and Minorities in Science, Engineering, and Technology Development.

Witnesses included: Colonel Eileen Collins, Commander STS–93, National Aeronautics and Space Administration; Dr. Gail Naughton, Ph.D., President and Chief Operating Officer, Advanced Tissue Sciences; Ms. Elaine Mendoza, Chairwoman, Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development; Ms. Danica McKellar, Actress, Mathematics graduate from the University of California.

Summary of hearing

Colonel Eileen Collins, Commander STS–93, National Aeronautics and Space Administration (NASA), stated NASA has significantly improved its Education Program. The programs reach out to elementary, secondary, and post-secondary communities in all 50 states. NASA programs include the Science, Engineering, Mathematics, Aerospace Academy (SEMAA), the Summer High School Apprentice Research Program (SHARP), and the Historically Black Colleges and Universities (HBCU's). NASA's SHARP program involves under-represented minority high school students in intensive research apprenticeships with scientists and engineers from NASA, in industry, and in universities. Colonel Collins added the SEMAA program serves over 2,000 K–12 students. The program's primary goal is to excite undeserved students in the areas of science, mathematics and technology.

Dr. Gail Naughton, Ph.D., President and Chief Operating Officer, Advanced Tissue Sciences, testified training in the sciences and engineering is long, expensive, and difficult. Starting salaries in these fields for new Ph.D.s are low, particularly for women and minorities. Dr. Naughton urged the Subcommittee to support developing grants and scholarships to encourage women and minorities to pursue technology careers. She added that financially sponsored high school and college internships could help to expose students to science in both academic and industrial environments. Dr. Naughton reiterated that programs to raise awareness and encourage young scientists are key.

Ms. Elaine Medoza, Chairwoman, Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development, stated the Commission has conducted a comprehensive review of existing education and work force data, past reports, and current trends. The outcome of the Commission's efforts is a carefully selected set of action-oriented recommendations which are designed to create a systematic change that is national in scope and structured for immediate implementation. She noted barriers exist today throughout the science, engineering and technology (SET) pipeline, from early education to higher education to the professional workforce, that limit the number of women, minorities and persons with disabilities seeking and retaining these jobs. In closing she discussed the Commission's recommendations to eliminate those barriers.

Ms. Danica McKellar, actress, mathematics graduate from the University of California, testified the problems with under-representation of women in SET fields boiled down to two fundamental issues: students are not prepared for SET careers, and students are not interested in SET careers. Ms. McKellar indicated there is a need to find qualified pre-college teachers. In addition, most students do not have any real concept of the options or opportunities available in SET careers.

4.5(ll)—The Role of Technical Standards in Today's Society and in the Future

September 13, 2000

Hearing Volume No. 106–92

Background

On September 13, 2000 the Subcommittee on Technology held a hearing entitled, "The Role of Technical Standards in Today's Society and in the Future." This hearing reviewed several standards and standards policy issues, including the development of a national standards strategy, U.S. participation in international standards setting organizations and new standards challenges caused by the evolution and convergence of new information technologies.

Witnesses included: The Honorable Raymond Kammer, Director, National Institute of Standards and Technology, Gaithersburg, MD; Mr. Oliver R. Smoot, Jr., Board Member, American National Standards Institute, Washington, DC; Dr. Carl Cargill, Director—Corporate Standards Sun Microsystems. Inc., Palo Alto, CA; Dr. Martin C. Libicki, Senior Policy Analyst RAND, Arlington, VA.

Summary of hearing

The Honorable Raymond Kammer, Director, National Institute of Standards and Technology, stated for the time, government, industry, standards developers and other interested parties have come together under the American National Standards Institute (ANSI) to develop a National Standards Strategy. He estimated about 80 percent of global merchandise trade is affected by standards and regulations that embody standards. He added the Administration supports industry and government participation in ANSI's international activities to ensure that the U.S. interests are represented.

Mr. Oliver R. Smoot, Jr., Board Member, American National Standards Institute, presented the "National Standards Strategy for the United States." This program will strengthen U.S. participation in international standardization activities and provide a framework that can be used to address the new standards challenges of emerging technologies. Implementation of the Strategy will significantly enhance the competitiveness of the U.S. ANSI has administered and coordinated the voluntary standardization system in the U.S. for nearly 100 years. ANSI accredits standards developing organizations and designates American National Standards that provide dimensions, ratings, terminology and symbols, test methods performance and safety requirements. ANSI is the U.S. representative to the two major, nontreaty international voluntary standards organizations, the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

Dr. Carl Cargill, Director—Corporate Standards Sun Microsystems. Inc., spoke about how standardization is a constantly evolving activity. The open source movement is the latest evolutionary activity in Information Technology standardization. The IT industry is investing heavily in standardization. Expenditures of

both financial resources and people in consortia, alliances and Open Source initiatives continue to grow as the World Wide Web and the Internet expand. The IT industry is a multi-national activity in which formal national standards organizations are playing a less significant role. He claims the role of government in standardizations must be increased to address concerns that relate to the "web-based standardization environment" including those issues of monopoly, anti-trust and intellectual property. Proposed expanded role for NIST—to coordinate consortia to talk and meet one another.

Dr. Martin C. Libicki, Senior Policy Analyst RAND, said today the ecology of standards development is less orderly but nevertheless robust and variegated. Research suggests standards ecology is healthy and is capable of handling the foreseeable next steps into e-commerce. He believes NIST should keep doing what it traditionally does, only more so and better. Suggested three roles: providing an expertly facilitated neutral meeting ground for the development of consensus, developing test methods by which standards and conformance to standards can be measured and act as a clearinghouse for standards development, particularly in the e-commerce arena.

4.5(mm)—Rural Access to Technology: Connecting the Last American Frontier

October 5, 2000

Hearing Volume No. 106–104

Background

On October 5, 2000 the Subcommittee on Technology held a hearing entitled, "Rural Access to Technology: Connecting the Last American Frontier." The hearing discussed existing information technology capabilities and services in rural United States communities. It also reviewed and showcased new technologies that could be deployed to help ensure access to information technology in these areas.

Witnesses included: Mr. Garen Ewbank, Executive Director, The National Interconnect Cooperative, Oklahoma City, OK; Mr. Guy Christiansen, Director, Regulatory Affairs, Sky Bridge LP, Bethesda, MD; Mr. William Luke Stewart, Chairman and Chief Scientist, Media Fusion Corporation, Dallas, TX; Mr. David Freeman, Chief Operating Officer, ACE Communication Group, Houston, Minnesota.

Summary of hearing

Mr. Garen Ewbank, Executive Director, The National Interconnect Cooperative, defines rural areas as locales and open country with less than 2,500 people. He believes there are six main factors that hinder bridging the digital divide. The six factors include: (1) regulation limits; (2) cost justification; (3) infrastructure build out; (4) technical expertise; (5) standard cost; and (6) change in responsibility. Mr. Ewbank urged Congress to look seriously at the benefits of new patented ideas and technologies, such as the Advanced Sub-Carrier Modulations.

Mr. Guy Christiansen, Director, Regulatory Affairs, Sky Bridge LP, testified in three years Sky Bridge will deploy a constellation of 80 low-earth orbit satellites with one goal to provide broadband access to areas that are either too remote or too expensive to reach using terrestrial technologies. They also estimate there will be over 400 million broadband users worldwide within the next four years. A quarter of those users will be in the United States and beyond the reach of terrestrial technology. They will have to rely on satellite technologies to fulfill their needs. Sky Bridge claims that not only are the problems of broadband access a problem in remote areas such as Alaska and Wyoming, but it effects areas within the New York- Washington corridor. Sky Bridge's business plan is based on an end user price of thirty dollars. This will include access to Internet at speeds of up to 20 megabits per second download and 2 megabits per second upload, as well as voice, videoconferencing and other data services.

Mr. William Luke Stewart, Chairman and Chief Scientist, Media Fusion Corporation claims the Advanced Sub-Carrier Modulation, which uses the electrical power grid to allow the transmission of duplex streaming audio, video, and data, can operate in any home with an electrical outlet. Furthermore, he stated the powergrid represents the most pervasive connectivity on America and the entire world. Media Fusion uses the electromagnetic energy, which surrounds, and is a part of the AC power transmission to carry out their special type of microwave fluctuations. Encoded within these fluctuations are voice, video and data signals that are sent to electrical outlets everywhere. Mr. Stewart adds that Media Fusion is now preparing for the next phase of system integration and testing, which involves building new prototype transmission equipment.

Mr. David Freeman, Chief Operating Officer, ACE Communication Group testified the costs of providing broadband services to rural areas are much higher than providing the service to the more urban areas of the country because of the following: (1) rural local exchange companies serve more geographically dispersed population; (2) rural local exchanges serve smaller exchanges; and (3) rural local exchange companies serve few customers overall and lack economies of scale. Ace Communication Group is a cooperative serving over 25,000 access lines with fourteen exchanges in Minnesota, ten in Iowa, and five in Michigan. Mr. Freeman urged Congress and the FCC to provide incentives. Furthermore, he asked for universal service support for broadband on a per line basis; investment tax credits for installing broadband services in the rural; assistance or tax credits for employees education and training for the new technology.

F. JAMES SENSENBRENNER, Jr., Wisconsin, CHAIRMAN

GEORGE E. BROWN, Jr., California
Ranking Minority Member

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March 4, 1999

The Honorable John R. Kasich
Chairman
Committee on the Budget
Washington, D.C. 20515

Dear Mr. Chairman:

Pursuant to the provisions of Clause 4(f) of House Rule X of the Rules of the House of Representatives for the 106th Congress and Section 301(d) of the Congressional Budget Act of 1974, as amended, I am transmitting the Views and Estimates of the Committee on Science for Fiscal Year 2000.

I look forward to working with you and your committee in developing this year's budget.

Sincerely,

F. JAMES SENSENBRENNER, JR.
Chairman

cc: The Honorable George E. Brown, Jr.
The Honorable John M. Spratt, Jr.

VIEWS AND ESTIMATES OF THE COMMITTEE ON SCIENCE FOR FISCAL YEAR 2000

In the next century, it is imperative that the United States of America maintain and improve its scientific, technical, and engineering base to sustain prosperity, meet the challenge of new ideas, and ensure a better quality of life for future generations. Notwithstanding the projections of budget surpluses, competition for scarce federal discretionary resources by competing interests requires Congress to stress the fundamental importance of federal science programs to the nation. In this fiscal environment, it is the view of the Committee on Science that funding for basic scientific research should take precedence over activities better conducted by the private sector, which tends to focus more on short-term, applied research.

Within this framework, the Committee on Science will continue to support the goal of increasing research funding in a responsible manner. This means that increases must fall within the discretionary budget caps and be predicated upon the following principles: First, federal research and development (R&D) must focus on programs that are long-term, high-risk, non-commercial, well-managed, and provide the potential for fruitful scientific advances. Second, federal R&D should hue closely to agency missions and be open to rigorous evaluations of quality and results. Third, beyond the demonstration of technical feasibility, research providing incremental improvements in a product or process design, or associated with marketing and commercialization, should be left to the private sector. Fourth, science partnerships of all kinds should be encouraged to leverage scarce taxpayer dollars. Finally, the infrastructure which makes essential federal R&D programs possible should be prioritized consistent with program requirements. The Committee believes that programs which fall short of these guidelines should be eliminated or decreased to allow for more promising research initiatives to emerge.

In Fiscal Year 1999, Congress, recognizing the strong correlation between scientific advancement and a growing economy, made R&D a priority. According to the American Association for the Advancement of Science, total federal support for R&D reached $80.2 billion last year, an increase of 5.3 percent over Fiscal Year 1998. Programs under the Science Committee's jurisdiction received an increase of 3 percent, or $716.7 million more than appropriated in Fiscal Year 1998.

The House of Representatives adopted H. Res. 578 stating that the National Science Policy Study, *Unlocking Our Future: Toward a New National Science Policy,* should serve as a framework for future deliberations on congressional science policy and funding. The National Science Policy Study stressed the importance of stable funding for fundamental research. Reflecting a similar emphasis, the Administration's Fiscal Year 2000 budget submission also bolsters basic science efforts, improves education funding, and extends the R&D tax credit.

The President's Fiscal Year 2000 science budget outlines some positive steps in strengthening our science priorities. For example, it includes a responsible 3 percent increase for civilian research and development spending. Nevertheless, although the Administration's proposed Fiscal Year 2000 budget increases programs under the Science Committee's jurisdiction by 3 percent, the Committee is concerned that total overall support for defense and non-defense R&D declines by 1 percent in Fiscal Year 2000.

One significant change from the Administration's Fiscal Year 1999 budget request is the small increase—2.1 percent, less than inflation—accorded the National Institutes of Health (NIH). The President's Fiscal Year 1999 budget called for an 8.4 percent increase in NIH, and with bipartisan support Congress boosted the Agency's Fiscal Year 1999 funding even further, to 14.4 percent above the Fiscal Year 1998 appropriation. While the Committee supports increases in biomedical research, we would submit that vacillating funding levels makes planning difficult and reduces efficiency. We would also note that often success in biomedical research is achieved because of advances in basic understanding in seemingly unrelated fields. The contributions of computer science, physics, mathematics, engineering and other fields to biomedical research illustrate the need to ensure that fundamental science remains an integral part of the federal government's overall research agenda.

As recommended by the National Science Policy Study, the Science Committee strongly urges the permanent extension of the R&D Tax Credit so as to provide a stable planning foundation for private industry. H.R. 760, as introduced, would permanently extend this tax credit, eliminating the uncertainty inherent in an annual extension, thereby encouraging industry to pursue the innovative long-term research that contributes to America's technological preeminence.

With a projected $70 billion federal budget surplus and a strong national economy, the Committee on Science is supporting efforts to substantially increase R&D funding, and would urge the Committee on the Budget and the Committee on Appropriations to increase funding by at least 3 percent for programs under the Science Committee's jurisdiction for Fiscal Year 2000. In addition, the Committee remains committed to the goal of stable and sustainable R&D funding over the next five years.

The Fiscal Year 2000 Views and Estimates for programs within the jurisdiction of the Committee on Science are contained in the following pages.

COMMITTEE ON SCIENCE

INFORMATION TECHNOLOGY FOR THE 21ST CENTURY

As part of the Fiscal Year 2000 budget, the Administration is proposing another new information technology initiative—Information Technology for the 21st Century (IT^2). As envisaged, the program will support activities in three areas: long-term information technology research; advanced computing for science and engineering; and research on the economic and social implications of the Information Revolution. The Administration is requesting $366 million for the initiative, which it claims is a 28 percent increase over current spending in information technology. IT^2 will be a joint project involving six agencies: the National Science Foundation ($146 million); the Department of Defense ($100 million); the Department of Energy ($70 million); the National Aeronautics and Space Administration ($38 million); the National Institutes of Health ($6 million); and the National Oceanic and Atmospheric Administration ($6 million).

The Committee has long supported basic research in the fields of computer and computational science and recognizes its importance to economic growth and national security. However, we are unclear as to how the Administration's latest initiative ties into and complements current information technology research. We would also note the relatively small

amount the Administration has allocated to NIH for this initiative. The Committee is aware that NIH is preparing a study on Information Technology (IT), but the $6 million requested is clearly inadequate when one considers the benefits to biomedical research--in telemedicine, genome research, etc.--that advanced IT provides.

In addition, the Committee is concerned about the level of funding in the outyears, the plan for coordination between the respective agencies, and the fulfillment of NSF and DOE's commitment to open competition in supercomputer contract awards. We hope that the Administration will forward to the Committee a detailed funding, management, and implementation plan for the IT^2 program that will place it in the context of current research efforts so that the Committee may consider this proposal in detail. Indeed, the Committee notes that authorizations for appropriations under the High-Performance Computing Act of 1991 expired at the end of Fiscal Year 1996, and sees this latest Administration initiative as providing a good opportunity to review thoroughly existing information technology programs in addition to those proposed under IT^2.

GOVERNMENT PERFORMANCE AND RESULTS ACT (Results Act)

Each year, American taxpayers invest billions of federal funds in civilian science agencies and programs. Rightly so, the American people are demanding that these funds be spent in a more efficient and businesslike manner. While the Nation has entered an era of projected federal budget surpluses, this does not justify wasteful inefficient management and spending for federal programs. We must continue to strive for good government, meaning efficient, effective and well managed programs. The Government Performance and Results Act aims to implement these principles in agencies practices.

The Government Performance and Results Act (the Results Act) continues to provide an effective oversight tool for the Science Committee to reexamine the value and effectiveness of science programs and legislate the necessary corrective measures to these programs. By Congress requiring agencies to adopt new planning, budgeting and reporting procedures, government agencies and programs should become more efficient, effective and accountable to the American taxpayer.

For Science, in particular, "the application of the Results Act to federal science projects must not result in a lost of efficiency by overwhelming scientists with burdensome bureaucratic obligations and distracting them from their research efforts," as the National Science Policy Study pointed out. There is a distinction, however, between high quality research and low quality research. That distinction can be measured. For example, the National Academy of Sciences' Committee on Science, Engineering, and Public Policy (COSEPUP) study included a roadmap for establishing useful measures for basic research. Moreover, as the Science Policy Study stated, "[s]cience often takes unexpected turns and researchers must be able to follow these unanticipated bends in the road to follow new, potentially more rewarding paths." As the COSEPUP study and the National Science Policy Study noted, scientists must be involved in the Results Act process in order to follow a roadmap to successfully implement the Results Act for science programs.

SUBCOMMITTEE ON BASIC RESEARCH

It is the Committee's view that supporting basic research, including math, science, and engineering education, is a proper role of government. In particular, the Committee has supported large funding increases for the National Science Foundation (NSF) and will support further increases consistent with fiscal realities and current law. The Committee also will continue to support education programs at NSF and will work with the agency to promote a sound education research agenda that will provide the foundation for improved student performance in science and math. In particular, the Committee will abide by the broad recommendations in the National Science Policy Study, some of which the President alluded to in his State-of-the-Union address, to improve United States performance in K-12 science and math. The Committee's education agenda will work to ensure education reforms have a solid intellectual footing.

The Committee further notes the importance of basic research to agency missions. To that end, the Committee will continue to support science programs that help protect life and property. The Science Committee has many programs under its jurisdiction that support such missions, including two under the Basic Research Subcommittee: the U.S. Fire Administration and the National Earthquake Hazards Reduction Program. With proper funding and management, these and other programs can have a tangible, beneficial effect on the lives of our citizens.

NATIONAL SCIENCE FOUNDATION (NSF)

NSF funds about 20,000 projects in research, engineering, and education, mostly through competitive, peer-reviewed grants and cooperative agreements to more than 2,000 universities, colleges, K-12 schools, businesses, and other research institutions throughout the United States. Although its budget level falls well below the National Institutes of Health and other agencies that support science, the role of NSF in promoting basic research is extremely important to the U.S. scientific enterprise. For example, about 25 percent of the federal dollars earmarked for basic research in academia is provided through NSF, as well as nearly 50 percent of the funding for non-medical university research. The Foundation also participates in international science projects.

For Fiscal Year 2000, the Administration has requested $3.954 billion for NSF which includes approximately $33.0 million from the H-1B immigration fees. This represents a 5.8 percent increase over the Fiscal Year 1999 appropriation of $3.737 billion and a 1.8 percent increase over the Fiscal Year 2000 authorization of $3.886 billion. The Committee supports increased funding for NSF and is pleased the Administration recognizes the importance of funding basic research and improving math and science education. Nevertheless, the Committee will carefully examine the request because it exceeds by **$35.3** million the amount authorized for NSF (P.L. 105-207), an amount which bipartisan majorities in both Houses of Congress strongly backed. The Committee expects NSF and other agencies under its jurisdiction to submit budget requests that fall within the amounts authorized under current law.

FEDERAL EMERGENCY MANAGEMENT AGENCY - UNITED STATES FIRE ADMINISTRATION (USFA)

Programs under the U.S. Fire Administration, which includes the National Fire Academy, support public education activities in fire safety, prevention, and control; data collection, analysis, and distribution; fire suppression research and development; arson prevention; and firefighter health and safety. The agency also supports a memorial for fallen fighters. Over the years, USFA has been credited with helping to reduce loss of life of both firefighters and civilians.

The President's Fiscal Year 2000 request for the United States Fire Administration, which includes the National Fire Academy, is $45.1 million, up 40 percent from the Fiscal Year 1999 appropriated level.

The Committee is disturbed by reports from the fire community that USFA has been poorly managed, under-staffed, and short of the necessary resources to fulfill its mission. The Committee notes that for the past few years, USFA budget requests have been nearly flat, despite an increase in responsibilities. The proposed increase in Fiscal Year 2000 represents a welcome change, and the Committee intends to conduct a thorough assessment of the USFA budget request to ensure that agency funding, management, and programs are able to fulfill its life-saving mission.

NATIONAL EARTHQUAKE HAZARDS REDUCTION PROGRAM (NEHRP)

NEHRP's research and mitigation activities greatly reduce the earthquake hazard risk in many parts of the country. For Fiscal Year 2000, the Administration has requested $102.8 million for the National Earthquake Hazards Reduction Program (NEHRP), a decrease of 0.5 percent from the Fiscal Year 1999 appropriation of $103.2 million.

Four agencies participate in NEHRP. The Federal Emergency Management Agency's (FEMA) request for "lead agency" activities, as well as earthquake planning and mitigation programs, is $15.4 million. The National Science Foundation (NSF) request is $37.6 million for fundamental earthquake studies, earthquake engineering research, and post-earthquake studies. NSF's request also includes $7.7 million for the proposed Network for Earthquake Engineering Simulation. The United States Geological Survey (USGS), which conducts research on earthquake hazards potential, earthquake effects, and post-earthquake phenomena, would receive $47.6 million under the President's request. The National Institute of Standards of Technology (NIST) has requested $2.2 million to improve codes and standards for lifelines and structures. The Committee notes that changes in the accounting structure for the USGS portion of the program account for the decline the NEHRP request and recognizes that, when this change is taken into account, the request represents an increase in the program of $6.8 million.

In past Views and Estimates, the Committee has faulted the Administration for submitting budget requests that fall short of what the Committee has authorized for the program and for not funding sufficient external research. The Committee, therefore, regards the Fiscal Year 2000 request favorably and will examine the need for increased funding for the real-time seismic warning system pilot program. In addition, the Committee will examine the need to modernize the nation's seismic monitoring network.

GLOBAL DISASTER INFORMATION NETWORK (GDIN)

The purpose of a Global Disaster Information Network, which would involve 12 agencies, is to integrate existing data resources from federal agencies, and provide useful information to emergency planners and response teams worldwide. Advances in the Internet and the growth in the use of geographic information systems, global positioning systems, and modeling and simulation techniques now make such a system possible. When fully implemented, GDIN would coordinate information used during all phases of disaster management.

For Fiscal Year 2000, the Administration has requested $10 million for GDIN—$2 million for the National Oceanic and Atmospheric Administration and $8 million for USGS. The Committee has long advocated greater use of data collected by federal agencies. Moreover, this proposal appears to be consistent with the Committee's long-standing commitment to use science to protect life and property.

SUBCOMMITTEE ON SPACE AND AERONAUTICS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

The Administration's Fiscal Year 2000 proposal reduces the agency's budget by $87 million, from a Fiscal Year 1999 funding level of $13,665.0 million to the Fiscal Year 2000 request of $13,578.4 million. For over five years, the White House has given NASA more responsibilities and progressively smaller budgets to accomplish its mission. However, for the first time in five years, the Administration has submitted a NASA budget that forecasts incremental increases in the outyears. The Committee supports a stable budget for NASA that enables the agency to focus on its core missions including basic scientific research, human and robotic exploration of space, and advanced technology development.

The Committee is dedicated to building and operating the International Space Station, the largest international scientific project ever undertaken. This orbiting research laboratory will be used by scientists to conduct experiments in the unique space environment of microgravity. It will also provide a steppingstone to the future economic development of Earth orbital space and human space exploration beyond the Earth's orbit. There are significant cost-saving and promising commercial opportunities regarding private sector participation in the operation and utilization of the International Space Station.

Unfortunately, the financial difficulties experienced by the Russian government and its inability to adequately fund the Russian components have caused assembly of the International Space Station to be delayed. Originally, the Space Station was supposed to begin assembly in November, 1997. That date slipped by one year to November, 1998. The first two elements of the Space Station have been mated and are currently in low Earth orbit. The third element, the Russian Service Module, originally scheduled for launch in April, 1998 has been postponed repeatedly. The most current date had been July, 1999. That date has now slipped to September, 1999 and could very well be delayed until November or December, 1999. The Russian Service Module is a crucial component as it provides the Station life support as well as navigation,

guidance, and control. Thus, its delay causes a ripple effect throughout the entire assembly schedule. Russia's financial situation does not appear to be improving. Therefore, the United States and the other international partners will be forced to endure continuing schedule delays and cost overruns until we end our dependence on Russia. Last Congress, the Committee attempted to impose accountability and stability into the program through the space authorization bill, H.R. 1275, the Civilian Space Authorization Act, Fiscal Years 1998 and 1999. The bill required the Administration to develop a contingency plan, with definite decision points, in the event that critical elements to be provided by the Russian government are unavailable. It required that costs of implementing such decisions be included and that monthly certifications on the Space Station work by the Russians be provided to Congress.

Since 1993, the Committee has advocated an enhancing, rather than enabling, role for Russia. The Committee's concerns about Russia's economic viability have unfortunately materialized. Severing our dependence on Russia is critically important to halt continuing delays, uncertainty, and cost growth. Finally, the Administration has submitted a budget that provides funding for an independent U.S. propulsion module and augments funding for a U.S. crew return vehicle. To the maximum extent possible, these efforts must be accelerated so the nation can stem the rising costs of this project. The U.S. must have these capabilities in order to complete the Space Station, with or without the Russians.

A constant high priority for the Committee is the safe operation of the Space Shuttle. The Space Shuttle program has been aggressively reducing its operations costs since Fiscal Year 1992. A large part of the credit for the cost reduction effort is due to the ongoing consolidation of operations into a single prime contract. This contract, the Space Flight Operations Contract, was awarded to the United Space Alliance in October, 1996. The contract provides for a phased approach to consolidating operations and all transitions are to be complete in Fiscal Year 2001.

The Committee is dedicated to the pursuit of basic research at NASA in the areas of space science and life and microgravity research. The Committee is pleased that the budget for Space Science is forecast for growth over the next five years. The very successful Mars Surveyor program continues with launches every 26 months consisting of both orbiters and landers. The Hubble Space Telescope continues to make exciting discoveries and the Stardust mission was recently launched to obtain a sample of primordial solar system constituents and return them to Earth. Space Science continues to live by the mantra, "faster, better, cheaper" and is currently in a nine-month period in which ten missions will be launched. In recent years the Committee has made clear its support for the purchase by NASA of commercial data wherever possible to meet its scientific needs, particularly for Earth Science. With the growing private sector interest in the use of space resources (such as the recently discovered water ice on the poles of the Moon), it may be desirable to create a new series of Lunar robotic exploration missions using data purchase mechanisms wherever possible.

The Committee continues to be concerned about the fate of life and microgravity research. Research to be conducted on the International Space Station is encompassed within life and microgravity research. Space Station research is one of the first places that experiences reductions when Space Station development comes up short on funding. This pattern continues over the next five years as Space Station research is cut by $200 million to fund cost overruns in Space Station development. Until Fiscal Year 1997, the Office of Life and Microgravity Sciences and Applications was responsible for managing the science budgets for the International Space Station. Since that time, management of these resources has resided in the International

Space Station office. This shift in management makes it easier for the research money to be funneled to Space Station development because it does not require prior Congressional approval. Fiscal Year 1999 appropriations directs NASA to transfer administrative responsibility for Space Station research back to the Office of Life and Microgravity Sciences and Applications. The Science Committee's space authorization bill for fiscal years 1998 and 1999, H.R. 1275, included a similar provision requiring Space Station research to be administered by the Office of Life and Microgravity Sciences and Applications and also fenced the funding specifically for research. Fiscal Year 1999 appropriations also included an additional $15 million in life and microgravity research for a Shuttle research mission. The appropriations conferees noted their concern about the lack of Shuttle-based science missions in Fiscal Year 1999. Ongoing research missions are critical for scientists who will eventually conduct research on the International Space Station. The Committee supports the addition of a dedicated research mission.

The Committee will monitor cancellation of the High Speed Research and Advanced Subsonic Technology programs within Aeronautics Research and Technology. The cancellations resulted in savings, of which a large portion has been funneled into the International Space Station over the next five years. The Committee intends to track the newly created focused programs within Aeronautics, particularly those for which the primary funding responsibility would seem to reside in the Federal Aviation Administration.

One of NASA's and the Committee's highest priority goals is the reduction of the high cost of space transportation, particularly for passengers and cargo between the surface and Earth orbit. The Committee believes that this goal requires both the development of more advanced technologies than in current space transportation systems and the discipline of a free and competitive market in launch services. While NASA initiated a Reusable Launch Vehicle technology development program in 1994, including the X-33 "Single Stage To Orbit" demonstration vehicle, funding was limited to only one test copy of one vehicle concept, and this funding ramps down significantly in Fiscal Year 2000 due to the expected completion of the X-33 and its series of test flights. At the Committee's urging, NASA has just begun the Future X program to develop additional concepts and technologies, but is only funding this effort at 20 percent of the average annual funding of the X-33 program. The Committee is concerned that this level of funding will be insufficient to produce the breakthroughs necessary to achieve affordable access to space.

Committee oversight of the Earth Science Enterprise will continue to push for program accountability and a reduction in its significant cost overruns and schedule slips. The Committee notes with serious concern the continuing problems which plague this highly complicated program. AM-1, recently renamed "Terra," had originally been scheduled to launch in June, 1998. Because of problems in the flight operations software, however, the launch has been delayed successively from December, 1998 to May, 1999 to July, 1999. While the flight operations software has been replaced with a commercial alternative, the science processing software is still experiencing significant delays. The science processing software will not be 100 percent capable when AM-1 is launched. The Committee is also concerned with the Landsat 7 mission, delayed from July, 1998 to April, 1999 because of sensor development problems. The Committee acknowledges the significant strides made with respect to data purchase policy. Earth Science Enterprise upper management has recognized this tool as a "normal way of doing business." While this policy is laudable, Earth Science still has a long way to go implementing it. For example, NASA pursued the development of a QuikScat satellite to replace ocean winds data

lost with the ADEOS-I failure, while simultaneously pursuing the commercial purchase of gap-filler wind data at a courser resolution. The Committee notes with grave concern that the QuikScat satellite was built and readied for launch by November, 1998, while NASA has not yet completed the data purchase as of mid-February, 1999.

In addition to these areas of concern identified by the Committee, the General Accounting Office (GAO) has identified a number of major management challenges at NASA since 1990. According to GAO, three areas continue to warrant further attention. These are: 1) "Weaknesses in Contract Management," citing concerns that NASA lacks adequate systems and processes to oversee procurement activities; 2) "Controlling International Space Station Costs," echoing many of the concerns cited above in addition to the GAO studies which have estimated life-cycle costs for the Station at $95.6 billion with a final assembly date slip from June, 2002 to December, 2003; and 3) "Following Through on Aerospace Test Facilities Cooperative Efforts," raising concerns over the conflicts with the Department of Defense which have arisen that jeopardize the 1996 joint agreement to cooperate in the construction and use of aerospace test facilities.

OFFICE OF SPACE COMMERCIALIZATION

The Office of Space Commercialization, located in the Technology Administration at the Department of Commerce, is responsible for promoting commercial space activities. The Fiscal Year 2000 request is $425,000, an increase over the Fiscal Year 1999 funding level of $418,500.

OFFICE OF COMMERCIAL SPACE TRANSPORTATION

The Office of Commercial Space Transportation, located in the Federal Aviation Administration at the Department of Transportation, issues licenses to commercial space transportation providers. The Fiscal Year 2000 request is $6,838,000, an increase of $687,000 over the Fiscal Year 1999 funding level of $6,151,000. The Committee notes the request for dramatically increased outyear funding levels. While the Office of Commercial Space Transportation has certainly increased its workload and areas of responsibility in recent years, the Committee intends to ensure that any contemplated increases in funding levels will be used toward activities that are consistent with the office's core mission.

SUBCOMMITTEE ON TECHNOLOGY

TECHNOLOGY ADMINISTRATION/OFFICE OF TECHNOLOGY POLICY

The Committee on Science created the Technology Administration (TA) through legislation in 1988 (the Omnibus Trade and Competitiveness Act of 1988 (P.L. 100-48)). TA consists of the National Institute of Standards and Technology (NIST), including the Advanced Technology Program (ATP) and the Manufacturing Extension Partnership (MEP); the National Technical Information Service (NTIS); and the Office of the Under Secretary for Technology/Office of Technology Policy (OTP).

The TA is headed by the Undersecretary for Technology who serves as the principal adviser to the Secretary of Commerce on Technology Policy.

The Committee believes the Office of Technology Policy can be run for less than the $9 million requested by the Administration. The Committee supports the Administration's intention to discontinue awarding grants under the newly created Experimental Program to Stimulate Competitive Technology (EPSCoT).

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

The Committee supports an increase in appropriations for NIST in Fiscal Year 2000 from the amount appropriated in Fiscal Year 1999.

Scientific and Technology Research and Services (STRS)

The Science Committee supports improving the federal infrastructure required to promote technology development. Of primary importance are the core functions of the National Institute of Standards and Technology (NIST), which are carried out under the Scientific and Technology Research and Services (STRS) budget account. The functions include: measurement and standards research in the areas of electronics and electrical engineering, manufacturing engineering, chemical science and technology, physics, materials science and engineering, fire prevention, computer systems, applied mathematics, and scientific computing.

For Fiscal Year 2000, the Administration's request is $290 million for the STRS account, an increase of $10 million from the Fiscal Year 1999 level of $280 million. While the President's funding request represents an overall increase from Fiscal Year 1999, the increase is so small that it amounts to a reduction in the overall level of effort for the STRS account. Under the request, four of the nine laboratory accounts will have to reduce their current level of effort, and the Fiscal Year 1999 budget of the Building and Fire Research account is cut by 8 percent. The Committee believes that NIST laboratories are its most important scientific research function, and should, at a minimum, maintain their current level of activity. The Committee therefore supports fully funding all STRS laboratory functions.

In addition, the Committee supports increasing funding to address critical computer security research needs as outlined in the 105th Congress by H.R. 1903, the Computer Security Enhancement Act. The Committee believes a substantial increase in Fiscal Year 2000 above the President's request would enhance computer security research and training.

Industrial Technology Services

The Administration's request for Advanced Technology Program (ATP) for Fiscal Year 2000 of $239 million is an increase of $40 million over the Fiscal Year 1999 level of $198 million. The request includes $73 million in new grants. The Committee recommends allocating sufficient funding to cover the existing mortgages for ATP. To date, the Department of Commerce has shown only anecdotal evidence that the program has yielded any benefit to United States competitiveness. Further, the Committee continues to be concerned that federal ATP grant money may simply be displacing private investment capital.

In their 1996 report, "Measuring Performance: The Advanced Technology Program and Private-Sector Funding," the General Accounting Office (GAO) indicated that more than half of ATP grant applicants did not look for private funding before applying for an ATP grant. At a February 25, 1998 hearing before the Science Committee, GAO testified that during the1997 awards process, ATP grant applicants were not required to report their efforts to find private funding.

Since then, new ATP rules have been instituted by the Secretary of Commerce to address this issue. However, according to GAO's testimony, the new ATP regulations are unlikely to prevent private capital from being displaced because no supporting documentation is required from grant applicants.

While the Committee believes that the new ATP regulations are a step in the right direction, more needs to be done. The Committee continues to support the legislative revisions to the NIST Act, embodied in H.R. 1274 as passed the House in the 105th Congress, that will ensure that private capital is not displaced by public funding. Until these fundamental reforms are enacted, the Committee will not support new ATP grants.

The Science Committee supports continuation of the Manufacturing Extension Partnership (MEP) program in Fiscal Year 2000. The Administration's requested funding level of $100 million is intended to support all existing MEP centers.

Construction

In addition, the Committee supports completion of funding for the Advanced Measurements Laboratory (AML). The $107 million outlined in the Administration's request for Construction and Maintenance should be sufficient to complete funding of the AML.

NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)

The Committee continues to support the activities of the National Technical Information Service (NTIS). Currently, NTIS is a self supporting agency, and is responsible for the collection and dissemination of scientific, technical, engineering, and other business-related information from federal and international sources. This year, the Administration has recommended funding specific NTIS archiving functions to help off-set the agencies annual operating losses. The Administration's recommendation for appropriating $2 million for NTIS will be reviewed by the Committee.

DEPARTMENT OF TRANSPORTATION

Surface Transportation Research and Development

The Science Committee supports the Administration's budget request of $641 million for surface transportation research and development in Fiscal Year 2000. During the 105th Congress, the Committee passed H.R. 860, the Surface Transportation Research and Development Act of 1997. While many of its provisions were incorporated into the Transportation Equity Act for the 21st Century (TEA-21), the recommended funding levels for research and development were

significantly reduced. The Science Committee recognizes that sufficient funding for surface transportation research and development is essential to achieve an efficient, long-lasting and safe surface transportation system, and therefore supports increased funding for research above the levels of TEA-21.

Federal Aviation Administration (FAA) Research and Development

The Science Committee recognizes that FAA research and development activities play an integral part in developing new air traffic control and aviation safety technology. The Committee agrees with the General Accounting Office and others who have stated that barriers to air traffic modernization are directly traceable to weaknesses in the agency's research and development efforts. In addition, the Committee finds that the FAA needs to fully acknowledge the importance of research and development when determining annual budget levels. The Committee continues its support for funding of programs within FAA Research, Engineering & Development at the $231 million level outlined in H.R. 1271 which passed by the House during the 105th Congress.

SUBCOMMITTEE ON ENERGY & ENVIRONMENT

DEPARTMENT OF ENERGY (DOE)

The Committee on Science has jurisdiction over DOE's civilian research, development, demonstration and commercial application of energy technology activities. The DOE's Fiscal Year 2000 budget request proposes to fund these activities through six appropriations accounts: Science, Energy Supply, Non-Defense Environmental Management, Fossil Energy R&D, Energy Conservation R&D, and the Clean Coal Technology.

The Department's Fiscal Year 2000 budget authorization request for programs under the Committee's jurisdiction is $4.942.9 million, DOE's total Fiscal Year 2000 budget authorization request is $4,986.9 million, an increase of $201.8 million, or 4.2 percent, above the Fiscal Year 1999 comparable appropriation of $4,785.1 million. DOE's total Fiscal Year 2000 request for budget authority (which includes the deferral of $256.0 million for Clean Coal Technology) is $4,740,862,000, a decrease of $4.2 million, or 0.1 percent, below the Fiscal Year 1999 budget authority of $4,745.1 million.

Major increases requested over the Fiscal Year 1999 appropriation include: (1) $221.1 million, or 24.5 percent, for the Administration's Climate Change Technology Initiative (CCTI); (2) $84.0 million, or 64.6 percent, million for the Spallation Neutron Source (SNS); and (3) $70.0 million to initiate the Scientific Simulation Initiative (SSI), a joint six agency program in advanced computing resources for use in scientific research that is part of the Administration's Information Technology for the Twenty-First Century (IT^2) Initiative.

The major decreases to the Fiscal Year 1999 appropriation are (1) $100.3 million, or 23.3 percent, to the Non-Defense Environmental Management Appropriation reflecting the transfer of activities to the Defense Environmental Restoration and Waste Management appropriation, as well as closeout of the Uranium Mill Tailings Remedial Action (UMTRA) Surface Project in

Fiscal Year 1999; and (2) $20.1 million, or 5.2 percent, to the Fossil Energy R&D account, including $9.9 for gas and $11.0 million for the use of prior year balances.

While the Committee supports DOE's overall Fiscal Year 2000 budget request level, it is concerned about a number of the Department's emphases. The Committee intends to increase support for DOE's long-term, high-risk, high-quality research and development activities, while simultaneously reducing funding for near-term, low-risk research, and for its commercialization and marketing efforts.

The Committee strongly supports the provision of $70 million in Fiscal Year 2000 funds for the Large Hadron Collider, consistent with the DOE-NSF-CERN agreement signed in December 1997.

One of the Committee's major concerns with DOE's Fiscal Year 2000 request is the status of the $1.36 billion Spallation Neutron Source (SNS), under construction at Oak Ridge National Laboratory. A technical review committee assembled by DOE's Office of Science has recently recommended that the project's management be strengthened and that its cost estimates be reexamined, indicating that the figures being used to estimate the current baseline SNS cost may no longer be reliable. The Committee notes that DOE has had difficulty completing large projects on time and within budget in the past. The General Accounting Office (GAO) found that from 1980 through 1996, DOE terminated 31 of 80 major systems acquisitions (mission-critical projects costing over $100 million) after expenditures of over $10 billion, and completed only 15, most of which were behind schedule and over budget. The Committee urges the DOE to promptly address the SNS shortcomings; significant project cost overruns and schedule slippages will not be tolerated.

The Committee once again observes that a large number of the programs included in DOE's CCTI request for Fiscal Year 2000 are identical to those about which objections were raised in the past. Many do not address R&D activities, but rather focus on near-term commercialization and market promotion efforts that are best left to the private sector. The Committee intends to carefully examine the proposed CCTI portfolio with the intent of redirecting funds, where appropriate, to longer-term, higher-risk and non-commercial activities.

The Committee continues to have major concerns with the Department's contract management, particularly with respect to the DOE National Laboratories where much of the civilian R&D is performed. The Energy Department is the largest civilian contracting agency in the federal government; in Fiscal Year 1997, it obligated about $16.2 billion, or nearly 91 percent of its obligations, to contracts. Since 1990, GAO has designated DOE contracting as a high-risk area vulnerable to waste, fraud, abuse and mismanagement because of the Department's heavy reliance on contractors and its history of weak contractor oversight. In addition, DOE's conduct of its R&D programs continues to be criticized for excessive bureaucracy, and for its emphasis on near-term, low-risk R&D, commercialization and marketing activities more properly performed by the private sector.

ENVIRONMENTAL PROTECTION AGENCY (EPA) R&D

The Committee on Science has or shares jurisdiction (with the Committee on Commerce) over EPA research and development programs which are funded in three separate appropriation accounts: (1) Environmental Programs and Management (Science Advisory Board); (2) Science

and Technology (including Superfund R&D, Leaking Underground Storage Tank (LUST) R&D, and Oil Spill Research); and (3) State and Tribal Assistance Grants.

The Agency's overall Fiscal Year request of $882.4 million for these programs represents an increase of $178.2 million, or 25.3 percent, over the Fiscal Year 1999 appropriation of $704.2 million.

Major increases over the Fiscal Year 1999 appropriation include: (1) $114.8 million, or 89.7 percent, climate change; and (2) $200.0 million for a "Clean Air Partnership Fund" to be distributed to state and local governments to improve air quality and to reduce greenhouse gases.

The major decrease from the Fiscal Year 1999 appropriation is $29.2 million, or 5.2 percent, for Science and Technology. The Committee views with alarm the continued erosion of EPA's Science and Technology account, and intends to support increases to EPA's R&D programs where those increases are justified. In addition, the Committee continues to be frustrated by EPA's continual lack of documentation and justification for its budget request, a concern shared by a number of independent bodies such as the National Academy of Sciences and the EPA Science Advisory Board. In particular, there is little justification provided for new climate change initiatives, or for the substantial cuts to the Science and Technology account.

The Committee also continues to be concerned about the shift in research and development resources away from Office of Research and Development (ORD) to Office of Air and Radiation (OAR) and other EPA program offices. These reallocations may affect the Agency's ability to perform thorough scientific research prior to implementing wide-ranging and expensive new regulations.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

The stated mission of the National Oceanic and Atmospheric Administration (NOAA) is to describe and predict changes in the Earth's environment, and to conserve and manage the Nation's coastal and marine resources to ensure sustainable economic opportunities. NOAA conducts research to develop new technologies, improve operations, and supply the scientific basis for managing natural resources and solving environmental problems.

The NOAA programs for which the Science Committee has sole jurisdiction include: the Oceanic and Atmospheric Research (OAR) office's Climate and Atmospheric Programs; the National Weather Service (NWS); and the National Environmental Satellite, Data and Information Service (NESDIS); associated facilities; and appropriate Construction items. The Subcommittee also shares jurisdiction (with the Committee on Resources) over the National Ocean Service (NOS) office's Navigation Services, Ocean Resources and Conservation Assessment, and Acquisition of Data programs; OAR's Ocean and Great Lakes, National Undersea Research, and Sea Grant Programs; Program Support; associated facilities; and Fleet Maintenance and Planning.

NOAA's total Fiscal Year 2000 request for new budget authorization is $1,785.3 million, an increase of $132.0 million, or 8.0 percent, above the Fiscal Year 1999 comparable appropriation of $1,653.9 million. NOAA's total Fiscal Year 2000 request for budget authority (which includes requests of $77.1 million for the Geostationary Operational Satellites (GOES) I-M and $54.5 million for the Sea Grant College already authorized by separate legislation) is $1,913.0 million, an increase of $120.7 million, or 6.7 percent, above the Fiscal Year 1999 comparable appropriation of $1,793.2 million.

Major increases over the Fiscal Year 1999 appropriation include: (1) $23.1 million, or 13.0 percent, for the NOS; (2) $28.9 million, or 4.4 percent, for the NWS; (3) $18.8 million, or 3.3 percent, for NESDIS; and (4) $49.2 million, or 424.2 percent, for Fleet Maintenance and Planning.

Of continuing concern to the Committee is the National Weather Service modernization program, which has been underway for over 15 years at a cost of about $4.5 billion. The General Accounting Office (GAO) continues to identify this program as a high-risk area, and it has been the subject of a number of critical reports by the Department of Commerce Inspector General (DOC IG). The deployment and development of the observing systems associated with the NWS modernization are nearing completion. However, unresolved issues remain concerning the observing systems' operational effectiveness and efficient maintenance, such as performance problems with the new radars and ground-based sensors. In addition, GAO has noted that the NWS lacks a means to ensure that the modernized NWS systems provide promised returns on investment. GAO also found that NWS has not demonstrated that all proposed capabilities will result in mission improvements.

The Committee is concerned about NOAA's FY 2000 request of $51.6 million to acquire a new fisheries research vessel (FRV), and its plans to spend an additional $133.1 million over the four-year period FY 2001-2004 to purchase three additional FRVs. For several years, the General Accounting Office, the Commerce Department's Inspector General and others have urged NOAA to pursue more cost-effective approaches to research and data collection. In the past few years, NOAA has increased its contracting with the private sector, universities, and other public entities. However, NOAA continues to rely greatly on its inefficient fleet that lacks the latest available technology, and continues to plan on replacing some these older vessels. Continued Congressional oversight is needed to ensure that NOAA pursues more cost-effective acquisition of research data.

The Committee is also concerned about other programs that have been the subject of GAO and/or DOC IG reports, including the NOAA Fleet, the NOAA Corps, Polar Orbital Environmental Satellite funding, and procurement of follow-on Polar Orbital Environmental Satellites (GOES).

The Committee generally supports most of NOAA's Fiscal Year 2000 budget request, but has serious concerns about the large increase requested in the Fleet Maintenance and Planning account.

CONCLUSION

The Committee on Science continues to support substantial and sustainable increases for scientific research and development for Fiscal Year 2000, and over the next five years. The Committee intends to work with the Committee on the Budget and the Committee on Appropriations to increase funding for basic research, scientific infrastructure, and for selected NASA and environmental programs while maintaining our commitment to the limitations imposed on discretionary spending.

COMMITTEE ON SCIENCE VIEWS AND ESTIMATES

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Additional Views and Estimates
Democratic Members
Committee on Science

Programs under the jurisdiction of the Committee on Science help to spur basic research and technological innovation, contributing to the long-term economic vitality of the American economy. Economic historians estimate that more than half the productivity growth in this century can be tied to technological innovations. Pressed to explain the prolonged economic expansion of the Clinton years, some economists point to the productivity gains from new computing and communications technologies. Beyond its economic effects, innovation, wisely applied, can also contribute to building a more just society.

The investments proposed by the Administration form an adequate basis for new innovation, ideas and processes and we are pleased to join the Majority in endorsing the President's civilian R&D funding levels for fiscal year 2000. In fact, we wish that the Committee's Views and Estimates had gone further in supporting a five-year plan for steady growth in these programs.

While we endorse the funding levels in the Committee's Views and Estimates, there are certain policy statements contained in that document which we cannot endorse. Those positions are portrayed as the Committee's position; to our knowledge, the Committee has yet to take formal policy positions on these matters in the 106th Congress. Some of the policy positions are contrary to positions taken by the Committee last year in legislative negotiations with the Senate. Other positions, such as the complaints about management of the Advanced Technology Program (ATP), seem to be taken without any awareness that the agency has addressed these management issues thoroughly and that the Visiting Committee on Advanced Technology describes the ATP as a "well-managed program" in its most recent report. In short, specific policy positions in the Committee's Views and Estimates should not be taken as dispositive. Rather, the oversight and authorization processes will provide an opportunity for all Members to air these and other issues and try to develop consensus positions for the Committee.

Congressman Ehlers, in his 1998 Science Policy Study, wrote of the need to bridge the "Valley of Death" that exists between basic research results and final commercial development. Despite this acknowledgment in the Science Policy Study, we note that the Majority continues to be selective in its affection for technology development and demonstration programs. In general, they support programs tied to aerospace and oppose programs designed to provide cheaper, cleaner energy, reduce pollution, or spur commercial innovation. As Democrats, we understand that the Federal government plays a unique role in helping overcome market failures by encouraging innovation and supporting the spread of promising technologies. The internet and commercial jetliners are both obvious examples of government support for innovation which have had enormously beneficial consequences for the economy and society.

We also believe that economic growth should not be the sole value guiding public policy. Other values and concerns should also inform our choices. Enhancing the quality of life by protecting the environment and providing access to health care; promoting, protecting and expanding opportunity for all our citizens; basic fairness and equity in treatment in the marketplace and in the eyes of the law—these are some of the core values that the Federal government should defend. We believe that these values should be weighed as we look at investment opportunities in science and technology. We would recommend that the Administration continue to invest in emerging technologies that enhance energy efficiency, keep our environment clean, meet the needs of our elderly, improve our citizens' health, provide stronger education for all of our children and prepare our workers for an ever more challenging technical workplace. As an example, we would strongly suggest that the Administration work with us and with the Budget and Appropriations Committees to restore full funding for education programs at NASA.

On a cautionary note, investments in science, technology, education, worker training or infrastructure will yield inadequate returns to the Nation if the government's fiscal house is not in order. While we are looking forward to the first on-budget surpluses in 30 years, those surpluses, projected for FY2001, hinge upon steady, non-inflationary

economic growth with full employment. We strongly encourage the Budget Committee to keep this situation in mind as it undertakes its difficult task and we would suggest the following general guidance.

First, we agree with the President that, after Social Security reform is implemented, 77% of any consolidated surplus must be set aside to save Social Security, strengthen Medicare and buy down the National debt. Attending to the financial health of Social Security is the single most important task facing the government and we strongly urge that steps be taken to provide assurance to our citizens that this cornerstone of our retirement system be financial secure.

Second, we would ask that the Committee be cautious in any move towards a tax cut. Proposals for across-the-board cuts promise to give away on-budget surpluses before we have even run one. Such precipitous action would threaten our long-term fiscal balance. Further, we would suggest that cuts which help our citizens deal with the challenges of child care, education, retirement savings and long-term care for our elderly would make a more intelligent allocation of those funds than a blanket cut. In any case, cuts should not be rushed out of Congress until we have greater assurance that the good economic times that have helped us balance the budget are here to stay.

George E. Brown, Jr.
Jerry Costello
Eddie Bernice Johnson
Zoe Lofgren
Sheila Jackson Lee
Bob Ethridge
John B. Larson
David Wu
Michael Capuano
Bart Gordon
James A. Barcia
Lynn Woolsey
Mike Doyle
Debbie Stabenow
Nick Lampson
Mark Udall
Anthony Weiner

Supplemental Views of Representatives
Ken Calvert and Vernon Ehlers
On the Committee on Science
Views and Estimates for Fiscal Year 2000
March 3, 1999

I am concerned about the potential conflict that arises by having a regulatory agency, such as EPA, also performing the R&D that provides the scientific basis for that agency's regulations. Many Federal agencies—such as the National Oceanic and Atmospheric Administration and the Department of Energy—perform important environmental R&D work that could be expanded to include most, if not all, of the current environmental R&D activities currently carried out by EPA, thereby providing the scientific basis for EPA's regulatory functions. I intend to explore the feasibility of this option during this Congress.

Vernon J. Ehlers
Ken Calvert

ADDITIONAL VIEWS
VIEWS AND ESTIMATES FOR THE HOUSE COMMITTEE ON BUDGET
CONGRESSMAN DAVE WELDON
MEMBER, COMMITTEE ON SCIENCE

As a member of the Committee on Science, I remain concerned about the disproportionate levels of funding that have existed among the various federal science agencies. It is my belief that the investment in scientific research is one of the most important investments that our Nation can make. It is a commitment for our future and for opening new fields of inquiry as well as an integral part of our Nation's economic growth.

There are numerous examples where scientific progress and technological developments in one field of science has provided the foundation for significant breakthroughs in biomedical areas. Likewise, there may be opportunities where funding for biomedical instrumentation and equipment will benefit the broader scientific interests of many scientists in other fields of research. One such area might be high-field nuclear magnetic resonance. Further developments in this area could lead to major breakthroughs in new materials, biotechnology, and biomedical advances. I would hope that the Committee on Science would strongly encourage these types of developments that will benefit a wide spectrum of the scientific community.

Additional Views and Estimates

While I join the Majority, and commend them for supporting the President's funding levels for R&D in fiscal year 2000, I specifically wish to address the Majority's lack of support for the Advanced Technology Program (ATP). ATP represents the importance, and success, of research partnerships between the Federal Government and industry.

With economic growth as its goal, ATP spurs technological development in areas that may be too risky for industry to tackle alone. These are the projects that traditional venture capitalists tend to shy away from, but there is a view that this could have a big payoff for us as a Nation. These technologies create opportunities for new world class products, services and industrial processes, benefiting not just the ATP participants but other companies and industries, and ultimately taxpayers as well. By reducing the early stage R&D risks for individual companies, the ATP enables industry to pursue promising technologies which otherwise would be ignored or develop too slowly to compete in a rapidly changing world market.

A survey of ATP participants highlighted their belief that these technologies would not have been developed with the same speed were it not for the ATP program. Personally, I have spoken to many entrepreneurs who believe ATP to be invaluable. The reality is that for far too many corporations in this country R&D is now heavily D and very little R, and that is where the ATP program steps in. The importance of this program for technological development and our movement to the millennium are immeasurable.

Lynn N. Rivers

ADDITIONAL VIEWS AND ESTIMATES OF REP. LYNN WOOLSEY

The views and estimates for the House Committee on Science represent many positions on which I agree with my colleagues. However, I feel that funding for the Space Station casts too large a shadow over areas that need to be funded at higher levels, such as education, healthcare, and the protection of our environment, as well as the space science and aeronautics programs at NASA. Viewed in this context, Space Station is too expensive and its cancellation would free up much needed resources for Fiscal Year 2000 and beyond.

Lynn Woolsey

F. JAMES SENSENBRENNER, Jr., Wisconsin, CHAIRMAN

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CHRIS CANNON, Utah
KEVIN BRADY, Texas
MERRILL COOK, Utah
GEORGE R. NETHERCUTT, Jr., Washington
FRANK D. LUCAS, OMahoma
MARK GREEN, Wisconsin
STEVEN T. KUYKENDALL, California
GARY G. MILLER, California
JUDY BIGGERT, Illinois
MARSHALL "MARK" SANFORD, South Carolina
JACK METCALF, Washington

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE

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Ranking Minority Member

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JERRY F. COSTELLO, Illinois
JAMES A. BARCIA, Michigan
EDDIE BERNICE JOHNSON, Texas
LYNN C. WOOLSEY, California
LYNN N. RIVERS, Michigan
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MICHAEL F. DOYLE, Pennsylvania
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DEBBIE STABENOW, Michigan
BOB ETHERIDGE, North Carolina
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ANTHONY D. WEINER, New York
MICHAEL E. CAPUANO, Massachusetts
BRIAN BAIRD, Washington
JOSEPH M. HOEFFEL, Pennsylvania
DENNIS MOORE, Kansas

March 3, 2000

The Honorable John R. Kasich
Chairman
Committee on the Budget
Washington, D.C. 20515

Dear Mr. Chairman:

Pursuant to the provisions of Clause 4(f) of House Rule X of the Rules of the House of Representatives for the 105th Congress and section 301 (d) of the Congressional Budget Act of 1974, as amended, I am transmitting the Views and Estimates of the Committee on Science for Fiscal Year 2001.

I look forward to working with you and your committee in developing this year's budget.

Sincerely,

F. JAMES SENSENBRENNER, JR.
Chairman

cc: The Honorable Ralph M. Hall
The Honorable John M. Spratt, Jr.

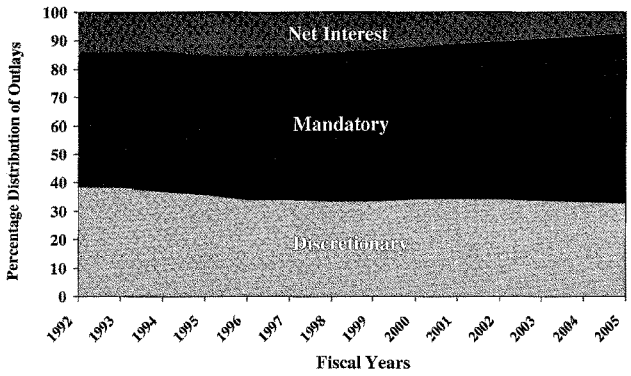
FJS/scr

VIEWS AND ESTIMATES OF THE COMMITTEE ON SCIENCE FOR FISCAL YEAR 2001

The Members of the Science Committee believe America's future preeminence in world affairs will be based more on economic strength than at any other time in our Nation's history. The robust economic strength that America enjoys today is a result of pioneering fundamental research and development activities of the not-too-distant past. Similarly, today's science, technology, and engineering base will improve the quality of life for future generations of citizens and will enable them to look back at this era and see it as the second "golden-age" of science.

Fiscal discipline at the Federal level has resulted in projections of budget surpluses well into the future. Continuing pressure from mandatory programs, however, will continue to squeeze discretionary funding.

Comparison of Mandatory, Discretionary and Net Interest Outlays Under President Clinton's Budgets (Actual Dollars, FY 1992-FY 2005)

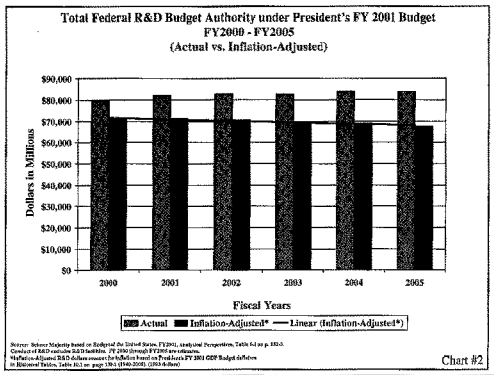


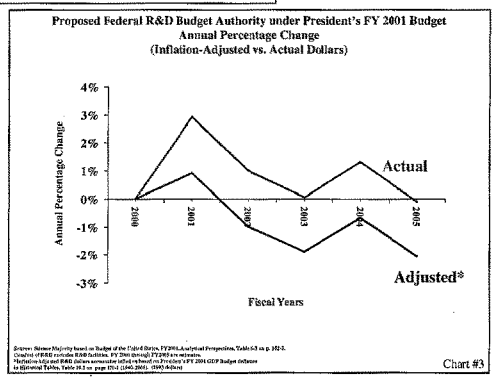
Source: Science Majority, based on the Budget of the United States, FY 2001, Historical Tables, Table 8.3
Fiscal Years 2000-2005 are estimates

Chart #1

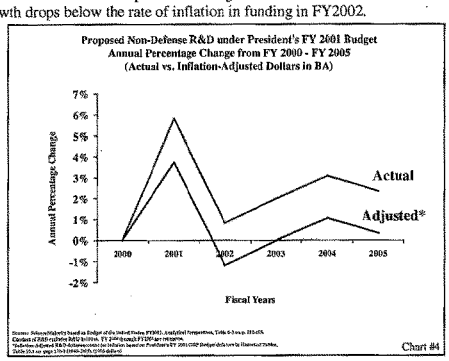
In FY2000, Congress affirmed the strong correlation between scientific advance and a growing economy by making discretionary R&D spending a priority. The American Association for the Advancement of Science (AAAS) notes that total federal support for total R&D in the FY2000 budget reached $83.3 billion last year, an increase of 5.0 percent over FY1999. Programs under the Science Committee's jurisdiction received an increase in FY2000 of 3.2 percent, or $798 million more than appropriated in FY1999.

The President's FY2001 science budget outlines some positive steps in strengthening our scientific enterprise and many of the new initiatives parallel the Committee's work. The President has proposed a 3 percent increase for total R&D in FY2001 actual dollars. Non-Defense R&D receives a significant increase of 6 percent in FY2001 in actual dollars under the President's budget. Despite those significant increases in FY2001, outyear budgets are either flat or actually decline. The President's budget fails to meet the stable and sustainable funding criteria needed for science and technology programs in the outyears.

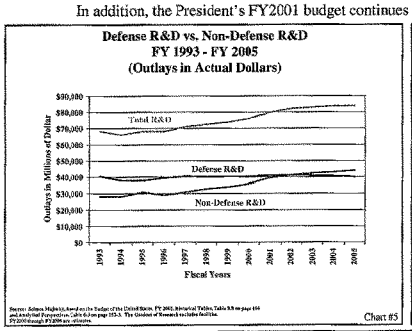


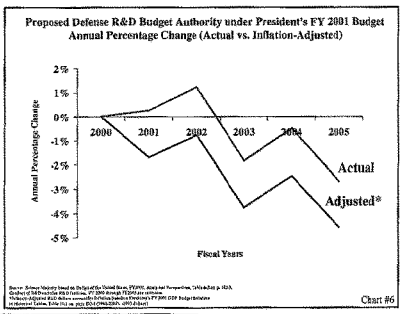


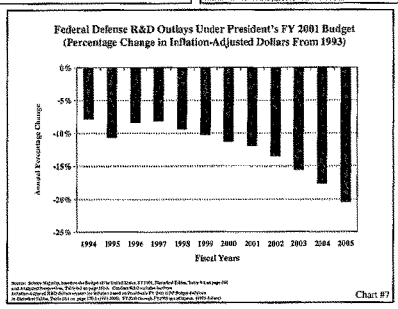
While Civilian R&D would receive a 6 percent funding increase in FY2001 actual dollars, the President's FY2001 budget growth drops below the rate of inflation in funding in FY2002.



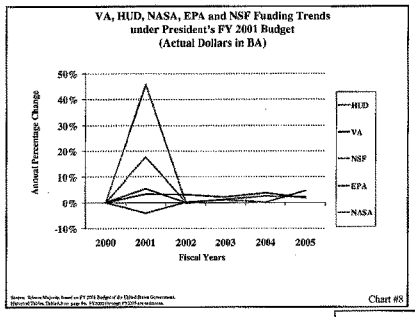
In addition, the President's FY2001 budget continues to decrease Defense R&D.

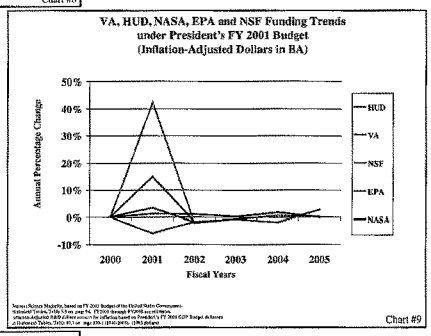


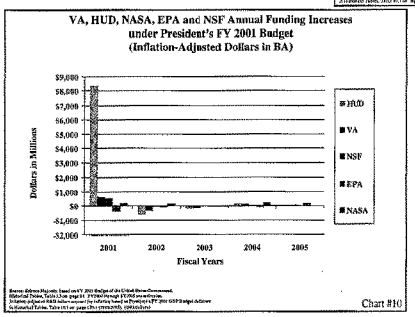




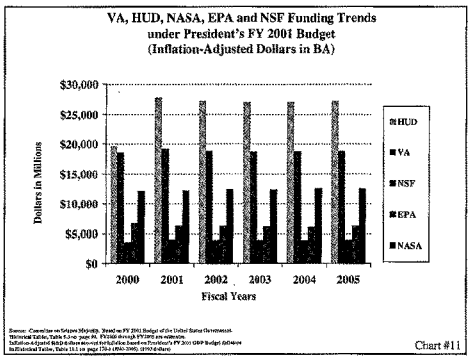
As stated, the President's FY2001 budget would provide an increase for civilian science agencies and departments. However, the President also provides large increases for competing programs within VA, HUD and Independent Agencies.



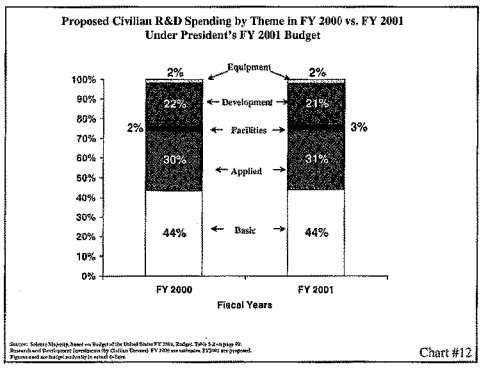




While science has a great impact on our economy and future, science programs will have to continue to demonstrate their importance versus other discretionary spending programs. Most of the Committee's science programs fall under the VA, HUD and Independent Agencies appropriations account. The budgets of NASA, EPA and NSF are dwarfed by other accounts in this appropriation bill.



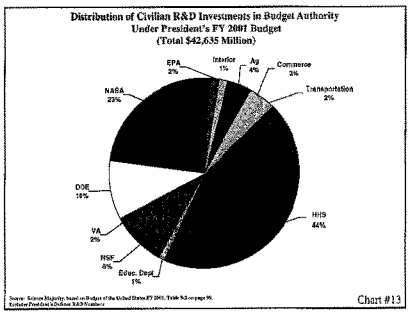
The National Science Policy Study of 1998 recognizes, "[t]he resources of the federal government will always be limited in that there are always greater numbers of worthwhile projects than there are dollars in the treasury to fund them." In order to maximize every science dollar, it is the view of the Committee on Science that funding for fundamental scientific research should take precedence over applied research that is better conducted by the private sector. The Study emphasized that the Federal Government must make basic research the federal research priority. In his FY2001 budget, the President also pledges to make long-term basic research a priority. It is true that basic research receives an increase over FY2000 in the President's FY2001 budget, but so does almost every other program. Thus, the Science Committee believes a more accurate depiction of the President's priority in science is illustrated in the distribution of funding between applied and basic research. This comparison of FY2000 and FY2001 civilian R&D spending by theme demonstrates that the Administration's stated emphasis on basic research is not reflected in the FY2001 budget.

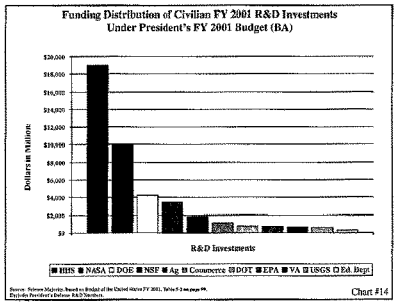


To maintain fiscal discipline while at the same time funding key scientific initiatives, the Committee on Science supports funding increases above the rate of inflation for civilian research and development programs for those programs that adhere to the following principles:

1. Federal R&D must focus on programs that are long-term, high-risk, non-commercial, and well-managed;
2. Federal R&D should adhere to agency missions and be open to rigorous evaluations of quality and results;
3. Federal R&D should not focus on technical feasibility or research providing incremental improvements in a product or process design, or associated with marketing and commercialization. These types of research should be left to the private sector;
4. Science partnerships should be encouraged to leverage scarce taxpayer dollars. However, the terms of these partnerships should be clear and the roles and responsibilities of the parties involved well defined; and
5. Federal R&D infrastructure needs to be prioritized in a manner consistent with R&D program requirements.

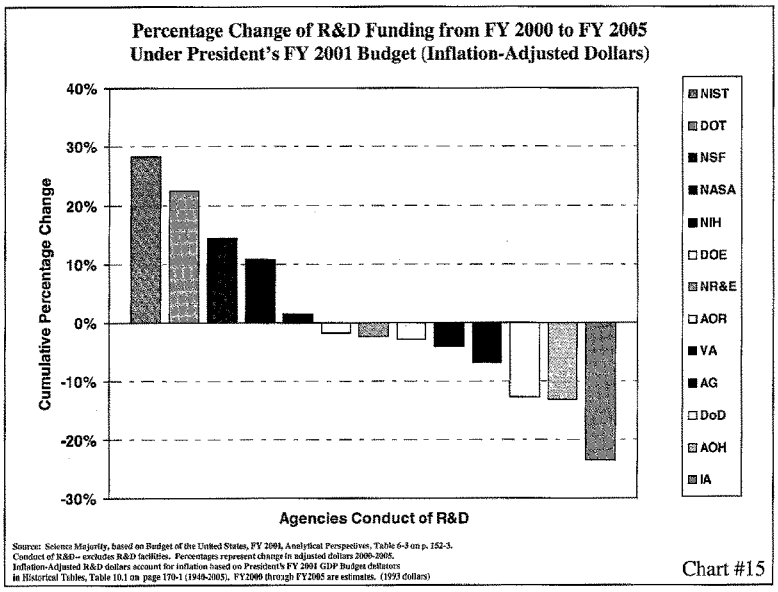
As a result of most R&D programs receiving increases, a way to evaluate the President's FY2001 R&D priorities is to examine the funding distribution for civilian R&D investments. The Department of Health and Human Services continues to be the President's FY2001 budget priority.





The Committee supports increases in biomedical research. These increases, however, must be accompanied by balanced increases in other research accounts. Success in biomedical research is achieved through advances in basic research across all disciplines of science. The contributions of computer science, physics, mathematics, engineering and other fields to biomedical research illustrate the need to secure funding for fundamental science as part of the Federal Government's overall research agenda.

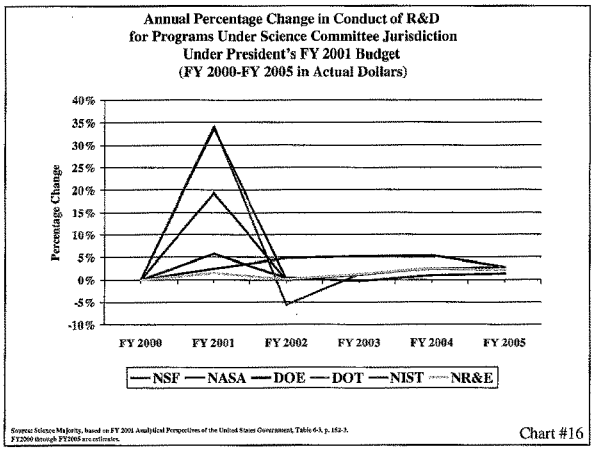
When viewing percentage increases for the conduct of R&D under the President's FY2001 budget, many of the agencies under the Science Committee's jurisdiction fare well compared to other R&D programs.

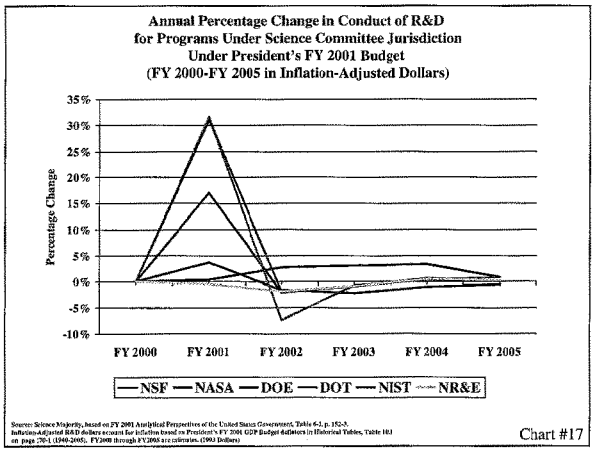


Source: Science Majority, based on Budget of the United States, FY 2001, Analytical Perspectives, Table 6-3 on p. 152-3.
Conduct of R&D-- excludes R&D facilities. Percentages represent change in adjusted dollars 2000-2005.
Inflation-Adjusted R&D dollars account for inflation based on President's FY 2001 GDP Budget deflators
in Historical Tables, Table 10.1 on page 170-1 (1940-2005). FY2000 through FY2005 are estimates. (1993 dollars)

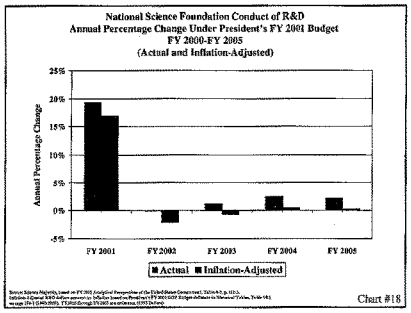
Chart #15

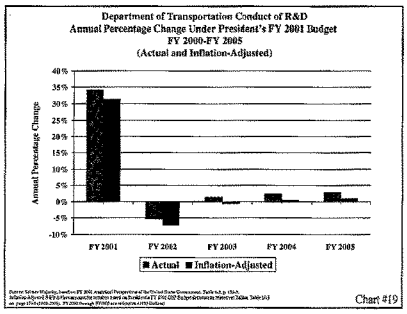
However, the Committee is concerned that all the growth appears in FY2001, with little or no commitment for other agencies' R&D outyear requirements.

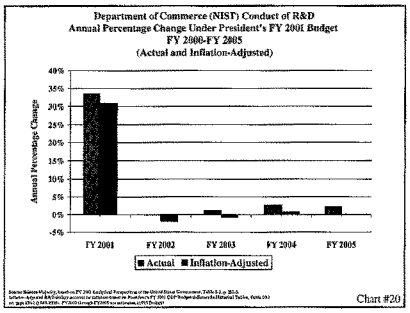




While the conduct of R&D at the National Science Foundation (NSF), the Department of Transportation (DOT) and Department of Commerce (DOC) would receive substantial increased funding in FY2001 under the President's budget proposal, they would be cut or frozen in actual and adjusted dollars from FY2002 through FY2005.







The conduct of R&D at the Department of Energy (DOE) would receive a 5.8 percent increase in FY2001 while programs under the Natural Resources and Environment category would receive a more modest 1.6 percent increase in FY2001. In actual dollars, however, spending would fall below the rate of inflation for FY2002. This trend continues for DOE through FY2005.

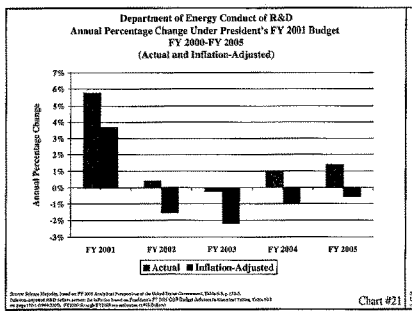


Chart #21

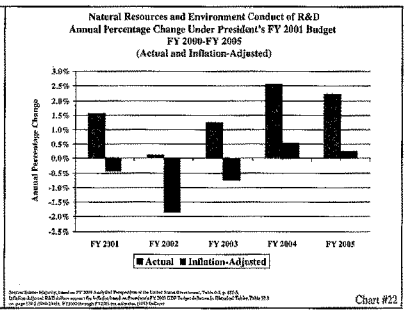


Chart #22

The National Aeronautics and Space Administration (NASA) appears to be the only agency within the Science Committee's jurisdiction that receives stable and sustainable funding for the 5 year run-out in the Administration's FY2001 budget request. The Committee is pleased that after years of declining NASA budget requests the NASA budget is stabilizing.

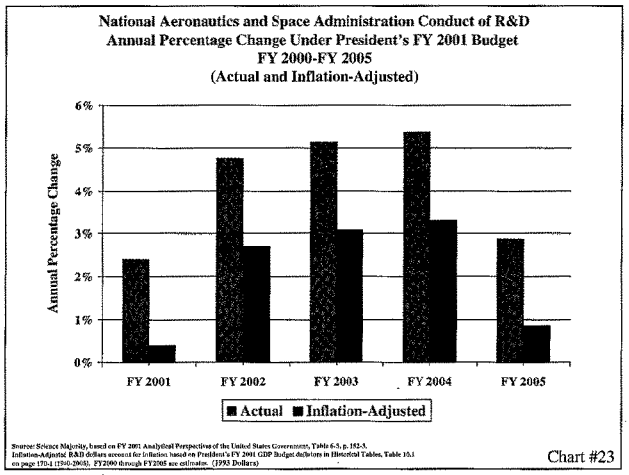
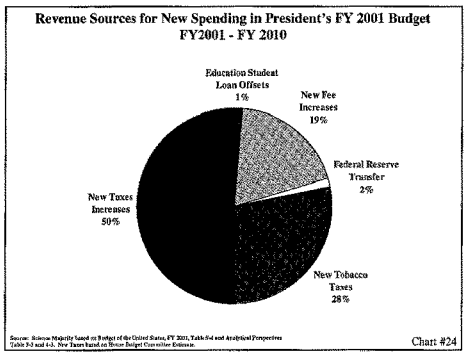


Chart #23

Finally, the Committee is concerned that the President's budget is based on uncertain and unlikely revenue sources. The Committee hopes that discretionary science programs do not suffer as a result of revenues that are unlikely to materialize.



We urge the Committee on the Budget to provide sufficient funding to meet the authorizations approved by the Science Committee. The Committee has set out its priorities in authorizations for programs under its jurisdiction.

They are:

H.R. 1184: To authorize appropriations for carrying out the Earthquake Hazards Reduction Act of 1977 for FY2000 and FY2001, and for other purposes.

H.R. 1550: To authorize appropriations for the United States Fire Administration for FY2000 and FY2001, and for other purposes.

H.R. 1551: To authorize the Federal Aviation Administration's civil aviation research and development programs for FY2000 and FY2001, and for other purposes.

H.R. 1552: Marine Research and Related Environmental Research and Development Programs Authorization Act of 1999.

H.R. 1553: To authorize appropriations for FY2000 and FY2001 for the National Weather Service, Atmospheric Research, and National Environmental Satellite, Data and Information Service activities of the National Oceanic and Atmospheric Administration, and for other purposes.

H.R. 1654: To authorize appropriations for the National Aeronautics and Space Administration for FY2000, FY2001, and FY2002, and for other purposes.

H.R. 1655: To authorize appropriations for FY2000 and FY2001 for the civilian energy and scientific research, development, and demonstration and related commercial application of energy technology programs, projects, and activities of the Department of Energy, and for other purposes.

H.R. 1656: To authorize appropriations for FY2000 and FY2001 for the commercial application of energy technology and related civilian energy and scientific programs, projects, and activities of the Department of Energy, and for other purposes.

H.R. 1742: To authorize appropriations for FY2000 and FY2001 for the environmental and scientific research, development, and demonstration programs, projects, and activities of the Office of Research and Development and Science Advisory Board of the Environmental Protection Agency, and for other purposes.

H.R. 1743: To authorize appropriations for FY2000 and FY2001 for the environmental and scientific and energy research, development, and demonstration and commercial application of energy technology programs, projects, and activities of the Office of Air and Radiation of the Environmental Protection Agency, and for other purposes.

H.R. 1744: To authorize appropriations for the National Institute of Standards and Technology for FY2000 and FY2001, and for other purposes.

H.R. 1273 (P.L. 105-207): A bill to authorize appropriations for FY1998 and FY1999 for the National Science Foundation, and for other purposes.

The FY2001 Views and Estimates for programs within the jurisdiction of the Committee on Science are contained in the following pages.

COMMITTEE ON SCIENCE

INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT

The United States stands as the global leader in computing, communication and information technology. This $500 billion-a-year industry accounted for one-third of our Nation's economic growth since 1992 and created new industries and millions of new, high-paying jobs. This staggering success, however, is predicated on Federal research conducted over the last three decades.

Fundamental IT research played an essential role in the Information Revolution. However, maintaining the Nation's global leadership in information technology is not a given. The congressionally chartered President's Information Technology Advisory Committee (PITAC) stated that the "current boom in information technology is built on basic research in computer science carried out more than a decade ago. There is an urgent need to replenish the knowledge base." Although the private sector conducts most of the IT research, that spending has focused on short-term, applied work. As the Nation's economy becomes more dependent on the Internet and IT in general, current federal programs and support for fundamental research in IT must be revitalized.

By a vote of 41-0, the Science Committee passed H.R. 2086, the Networking and Information Technology Research and Development Act (NITRD), a five-year authorization bill in September of 1999. The House passed the bill by voice vote on February 15, 2000.

H.R. 2086 provides comprehensive authorization for the Federal Government's civilian basic information technology research effort at the six agencies under the Science Committee's jurisdiction: NSF, NASA, DOE, National Institute of Standards and Technology (NIST), National Oceanic and Atmospheric Administration (NOAA), and Environmental Protection Agency (EPA).

This bill fundamentally will alter and greatly enhance the way information technology research is supported and conducted. Its centerpiece is the Networking and Information Technology Research and Development program, which will be managed primarily through NSF and will focus on long-term, peer-reviewed basic research of the kind in which NSF excels.

While funding for individual investigators remains an important aspect of IT research, funding for research teams and centers also can lead to dramatic progress. Therefore in FY2001, the bill authorizes $25 million

for large grants of up to $1 million for high-end computing, software, and networking research and $45 million for information technology research centers that are comprised of research teams of six or more members.

To attract more students to science and to careers in IT, the bill also authorizes $95 million for universities to establish for-credit internship programs for IT-related research at private high-tech companies. Both two- and four-year schools will be eligible for these grants, which will operate on a 50-50 cost sharing basis.

To help meet the need for state-of-the-art computing systems for the civilian research community in FY2001, H.R. 2086 authorizes $70 million for a terascale computing competition at NSF. The bill requires that the funds be allocated on a competitive, peer-reviewed basis, and that awardees be required to connect to the Partnership for Advanced Computational Infrastructure (PACI) network.

The bill also authorizes the Next Generation Internet program through completion in FY2002.

Our future global influence lies in the hands of our young people, the education and training they receive, and the new scientific breakthroughs they produce. H.R. 2086 combines increased authorizations for research funding with important policy changes that will keep the Nation at the cutting edge of information technology and produce the next generation of highly skilled IT workers. It offers opportunities for all by providing open competition for IT grant funding, as well as benefiting diverse groups ranging from two-year community colleges to the largest universities.

This bipartisan legislation demonstrates a commitment to upholding our Nation's preeminence in information technology. It has been endorsed by dozens of organizations including the 1999 co-chairs Bill Joy and Ken Kennedy of PITAC, the Technology Network, the Computing Research Association, the Big Ten Universities and the U.S. Chamber of Commerce.

During consideration of the bill on the House floor, the House adopted an amendment by Congressman Capuano to reduce funding for DOE's High Performance Computing and Communication (HPCC) program and transfer the funding to NSF. The Committee supports this prioritization of NSF basic research and encourages the Committee on Budget to reallocate funding accordingly.

RESEARCH AND DEVELOPMENT TAX CREDIT

The Science Committee continues to support the National Science Policy Study goal to permanently extend the R&D Tax Credit to create a stable R&D planning foundation for private industry. The Committee believes that last year's five-year extension of the R&D credit is a positive step in this endeavor.

GOVERNMENT PERFORMANCE AND RESULTS ACT (Results Act)

Each year, American taxpayers invest billions of federal funds in civilian science agencies and programs. Rightly so, the American people are demanding that these funds be spent in a more efficient and businesslike manner. While the Nation has entered an era of projected federal budget surpluses, this does not justify wasteful inefficient management and spending for federal programs. We must continue to strive for good government, meaning efficient, effective and well managed programs. The Government Performance and Results Act aims to implement these principles in agencies practice.

The Government Performance and Results Act (the Results Act) continues to provide an effective oversight tool for the Science Committee to reexamine the value and effectiveness of science programs and legislate the necessary corrective measures to these programs. By Congress requiring agencies to adopt new planning, budgeting and reporting procedures, government agencies and programs should become more efficient, effective and accountable to the American taxpayer.

For science, in particular, "the application of the Results Act to federal science projects must not result in a lost of efficiency by overwhelming scientists with burdensome bureaucratic obligations and distracting them from their research efforts,"[1] as the National Science Policy Study pointed out. There is a distinction,

however, between high quality research and low quality research. That distinction can be measured. For example, the National Academy of Sciences' Committee on Science, Engineering, and Public Policy (COSEPUP) study included a roadmap for establishing useful measures for basic research. Moreover, as the Science Policy Study stated, "[s]cience often takes unexpected turns and researchers must be able to follow these unanticipated bends in the road to follow new, potentially more rewarding paths."[2] As the COSEPUP study and the National Science Policy Study noted, scientists must be involved in the Results Act process in order to follow a roadmap to successfully implement the Results Act for science programs.

SUBCOMMITTEE ON BASIC RESEARCH

It is the Committee's view that supporting basic research, including math, science, and engineering education, is a proper role of government. In particular, the Committee has supported large funding increases for the National Science Foundation (NSF) and will support further increases consistent with fiscal realities. The Committee also will continue to support education programs at NSF and will work with the agency to promote a sound education research agenda that will provide the foundation for improved student performance in science and math. In particular, the Committee will abide by the broad recommendations in the National Science Policy Study to improve United States performance in K-12 science and math. The Committee's education agenda will work to ensure education reforms have a solid intellectual footing.

The Committee further notes the importance of basic research to agency missions. To that end, the Committee will continue to support science programs that help protect life and property. The Science Committee has many programs and agencies under its jurisdiction that support such missions, including two under the Basic Research Subcommittee: the U.S. Fire Administration and the National Earthquake Hazards Reduction Program. With proper funding and management, these and other programs can have a tangible, beneficial impact on the lives of the Nation's citizens.

NATIONAL SCIENCE FOUNDATION (NSF)

NSF funds about 19,000 projects in research, engineering, and education, mostly through competitive, peer-reviewed grants and cooperative agreements, to more than 2,000 universities, colleges, K-12 schools, businesses, and other research institutions throughout the United States. Although its budget level falls well below the National Institutes of Health and other agencies that support science, the role of NSF in promoting basic research is extremely important to the U.S. scientific enterprise. For example, about 25 percent of the federal dollars earmarked for basic research in academia is provided through NSF, as well as nearly 50 percent of the funding for non-medical university research. The Foundation also participates in international science projects.

For FY2001, the Administration has requested $4.60 billion for NSF, which includes approximately $31.0 million from the H-1B immigration fees. This represents a 17.1 percent increase over the FY2000 appropriation of $3.93 billion. Included in this proposal are initiatives for information technology research (up 160 percent to $327 million), nanotechnology (up 123 percent to $217 million), biocomplexity in the environment (up 173 percent to $136 million), and the 21st century workforce (up 113 percent to $157 million.

As the current authorization for NSF (P.L. 105-207) expires at the end of FY2000, the Committee will be taking up a reauthorization bill in the coming months. The Committee supports the increased funding requested for NSF and is pleased the Administration recognizes the importance of funding basic research. However, it is concerned that the increase for FY2001 may amount to a one-time funding bump, as the out-year estimates provided by the Administration suggest. The Committee believes that science funding should not move in fits and starts, and it hopes that future Administrations can improve on the out-year projections provided in the current budget proposal.

FEDERAL EMERGENCY MANAGEMENT AGENCY - UNITED STATES FIRE ADMINISTRATION (USFA)

Programs under the U.S. Fire Administration (USFA), which includes the National Fire Academy, support public education activities in fire safety, prevention, and control; data collection, analysis, and distribution; fire suppression research and development; arson prevention; and firefighter health and safety. The agency also supports a memorial for fallen firefighters. Over the years, USFA has been credited with helping to reduce loss of life of both firefighters and civilians.

In the First Session, the Committee passed H.R. 1550, the Fire Administration Authorization Act of 1999, through the House. H.R. 1550 authorizes $49.5 million for FY2001 for USFA activities. The President's FY2001 request for base programs at USFA is $44.8 million, up 4.1 percent from the FY2000 appropriated level, but 9.6 percent below the $49.5 million authorized for FY2001 in H.R. 1550.

In addition, the Administration is proposing a $25 million pilot grant program to provide health and safety firefighter equipment in needy communities. There are a number of questions that need to be answered about this program, including whether or not USFA is the appropriate agency to administer it, particularly in light of recent concerns about how the agency is managed. The Committee recognizes the valuable contribution first responders make to their communities, and it will continue to work to ensure the effectiveness of the USFA programs on which volunteer and professional firefighters rely for training, research, public education, and other services.

NATIONAL EARTHQUAKE HAZARDS REDUCTION PROGRAM (NEHRP)

NEHRP's research and mitigation activities have the potential to reduce greatly the earthquake hazard risk in many parts of the country. Four agencies participate in NEHRP: the Federal Emergency Management Agency (FEMA), which directs earthquake planning and mitigation programs; NSF, which supports fundamental geological and engineering research; United States Geological Survey (USGS), which conducts research on earthquake hazards potential, earthquake effects, and post-earthquake phenomena; and National Institute of Standards of Technology (NIST), which is involved in developing building standards.

H.R. 1184, the Earthquakes Hazards Reduction Authorization Act of 1999, which passed the House during the First Session, authorizes $174.8 million for the program, including an authorization of $44 million for the Advanced National Seismic Research and Monitoring System at USGS and $28.2 million for the Network for Earthquake Engineering Simulation (NEES) at NSF.

For FY2000, the Administration has requested $127.4 million for NEHRP, an increase of 24.2 percent from the FY2000 appropriation of $102.6 million. Much of this increase is attributed to the NSF request for NEES, which would rise from $7.7 million in FY2000 to $28.2 million in FY2001, in keeping with the funding profile laid out in H.R. 1184. The Committee would have preferred to see additional money being made available for the Advanced Seismic System at USGS in the Administration's budget, but recognizes the $2.6 million in added funding for this project is a step in the right direction.

SUBCOMMITTEE ON ENERGY & ENVIRONMENT

DEPARTMENT OF ENERGY (DOE)

The Committee on Science has jurisdiction over DOE's civilian energy research, development, demonstration and commercial application of energy technology activities. DOE's FY2001 budget request proposes to fund these activities through six appropriations accounts: Science, Energy Supply, Non-Defense Environmental Management, Fossil Energy R&D, Energy Conservation R&D, and Clean Coal Technology.

DOE's FY2001 budget authorization request for programs under the Committee's jurisdiction is $5,156.5 million. This is an increase of $463.4 million—or 9.9 percent—above the FY2000 appropriation of $4,693.1 million and an increase of $82.9 million—or 1.6 percent—above the comparable FY 2001 level of $5,073.6 million authorized by P.L. 104-271 (Hydrogen Future Act of 1996), Section 10 of P.L. 105-388 (Energy

Conservation Reauthorization Act of 1998), the House-passed version of H.R. 1655 (DOE Research, Development, and Demonstration Authorization Act of 1999), the Committee on Science's reported version of H.R. 1656 (DOE Commercial Application of Energy Technology Authorization Act of 1999), and the House-passed version of H.R. 2086 (Networking and Information Technology Research and Development Act).

Increases over the FY2000 comparable appropriation include: (1) $99.4 million, or 32.0 percent, for Solar and Renewable Resources Technologies; (2) $11.7 million, or 4.8 percent, for Nuclear Energy; (3) $2.0 million, or 5.1 percent, for Non-Defense Environment, Safety and Health; (4) $10.9 million, or 1.5 percent for High Energy Physics; (5) $14.1 million, or 4.0 percent, for Nuclear Physics; (6) $11.2 million, or 2.6 percent, for Biological and Environmental Research; (7) $236.3 million, or 30.3 percent, for Basic Energy Sciences; (8) $54.1 million, or 42.3 percent, for Advanced Scientific Computing Research; (9) $9.5 million, or 7.2 percent, for Science Program Direction; and (10) $63.7 million, or 11.2 percent, for Energy Conservation R&D. Decreases from the FY2000 appropriation include: (1) $0.5 million, or 0.2 percent, for Fusion Energy Sciences; (2) $21.2 million, or 6.9 percent, for Non-Defense Environmental Management; and (3) $28.4 million, or 7.0 percent, for Fossil Energy R&D.

Increases over the FY2001 comparable authorized levels include: (1) $9.7 million, or 2.2 percent, for Biological and Environmental Research; (2) $260.8 million, or 34.6 percent, for Basic Energy Sciences; and (3) $80.3 million, or 79.0 percent, for Advanced Scientific Computing Research. Decreases from the FY2001 comparable authorized levels include: (1) $37.8 million, or 8.5 percent, for Solar and Renewable Resources Technologies; (2) $4.1 million, or 1.6 percent, for Nuclear Energy; (3) $10.7 million, or 21.1 percent, for Non-Defense Environment, Safety and Health; (4) $44.7 million, or 5.9 percent, for High Energy Physics; (5) $14.0 million, or 3.7 percent, for Nuclear Physics; (7) $30.9 million, or 11.1 percent, for Fusion Energy Sciences; (8) $11.2 million, or 7.3 percent, for Science Program Direction; (9) $27.1 million, or 8.7 percent, for Non-Defense Environmental Management; (10) $61.8 million, or 14.1 percent, for Fossil Energy R&D; and (11) $43.2 million, or 6.4 percent, for Energy Conservation R&D.

The Committee supports DOE funding levels authorized either by current law or by House-passed or Committee on Science-reported legislation, particularly for those programs that emphasize long-term, high-risk, high-quality R&D activities. The Committee also notes the need for enactment of the management reforms contained in H.R. 1655 and H.R. 1656 to address the numerous examples of mismanagement and waste in current DOE programs.

Last year, the Committee noted that one of its major concerns was the Spallation Neutron Source (SNS) project under construction at Oak Ridge National Laboratory. At that time, a technical review committee assembled by DOE's Office of Science had recommended that the project's management be strengthened and that its cost estimates be reexamined, indicating that the figures being used to estimate the current baseline SNS cost may no longer be reliable. Subsequent reviews by a DOE external independent review team and the U.S. General Accounting Office (GAO) echoed these findings. As a result, the Committee proposed, and the House adopted, legislation (H.R. 1655) that authorized limited SNS construction funds for FY2000 only and made the release of these funds contingent on a number of specific management actions. These requirements were also included in P.L. 106-60 (Energy and Water Development Appropriations Act, 2000) and the Committee is pleased to note that they have been met—including the enactment of a statute by the State of Tennessee that exempts the SNS from all Tennessee State and Use Taxes, an exemption that will save taxpayers $28.3 million in the project's cost. Consequently, the Committee supports the FY2001 request of $281.0 million—including $261.9 million for construction and $19.1 million for SNS R&D and related project costs. The Committee intends to continue to be vigilant in its oversight of the project.

The Committee is concerned about the overall health of DOE's Science programs—particularly its scientific facilities. The FY2001 requests for High Energy Physics, Nuclear Physics, and Fusion Energy Sciences are essentially flat or declining and fail to keep pace with the rate of inflation. As a consequence, many of the facilities supported by these programs—representing a multi-billion dollar investment by the taxpayers—will operate fewer hours in FY2001, including a more than 24 percent reduction in operating time of the Tevatron at Fermilab, a nearly 8 percent decline at Stanford Linear Accelerator Center, and a more than 22 percent

decline at the Alcator C-Mod fusion facility at MIT. In addition, the DOE Science budget is estimated to either decline or remain essentially flat for the next several fiscal years after the scheduled increases for SNS construction are taken into account. The Committee notes DOE's enthusiasm for building new facilities and its reluctance for providing adequate operating funds once they are built.

ENVIRONMENTAL PROTECTION AGENCY (EPA) R&D

The Committee on Science has or shares jurisdiction with the Committee on Commerce over EPA R&D programs that are funded in three separate appropriation accounts: (1) Environmental Programs and Management (Science Advisory Board and Climate Change Technology Initiative); (2) Science and Technology (including Superfund R&D, Leaking Underground Storage Tank (LUST) R&D, and Oil Spill Research); and (3) State and Tribal Assistance Grants (Clean Air Partnership Demonstration Fund).

The Agency's overall FY2001 request is $919.9 million for these programs. This is an increase of $200.8 million—or 27.9 percent—above the FY2000 appropriation of $719.2 million and an increase of $129.3 million—or 16.4 percent—above the FY2001 level of $790.6 million authorized by Section 201 of P.L. 104-182 (Safe Drinking Water Act Amendments of 1996); the House-passed version of H.R. 2086 (Networking and Information Technology Research and Development Act); and Committee on Science's reported versions of H.R. 1742 (EPA Office of Research and Development and Science Advisory Board Authorization Act of 1999) and H.R. 1743 (Environmental Protection Agency Office of Air and Radiation Authorization Act of 1999).

Increases over the FY2000 appropriation include: (1) $124.0 million, or 120.0 percent, for the Climate Change Technology Initiative (CCTI); and (2) $85.0 million for a "Clean Air Partnership Demonstration Fund" under Section 103 of the Clean Air Act (Research, investigation, training, and other activities) "to fund projects that achieve innovative and early air pollution and greenhouse gas emission reductions." Decreases from the FY2000 appropriation include: (1) $4.0 million, or 0.8 percent, for the EPA Office of Research and Development (ORD); and (2) $4.4 million, or 5.5 percent, for the EPA Office of Air and Radiation (OAR) non-CCTI science activities.

Increases over the FY2001 authorized levels include: (1) $118.3 million, or 108.6 percent, for CCTI; and (2) $85.0 million for the Clean Air Partnership Demonstration Fund. Decreases from the FY2001 authorized levels include: (1) $20.9 million, or 3.8 percent, for ORD; and (2) $53.1 million, or 41.5 percent, for OAR non-CCTI science programs.

On February 7, 2000, the EPA issued a press release that stated that this "budget includes the single largest increase in EPA's operating programs in the history of the Clinton/Gore Administration in spending for essential operations to provide cleaner air, cleaner water, safer food, and sound science." *The Committee notes that the Administration has actually cut EPA's total non-CCTI science funding for ORD and OAR by a total $8.4 million, or 1.4 percent, from the FY 2000 appropriated levels, and by an astounding $73.9 million, or 10.9 percent from the level authorized by the Science Committee in H.R. 1742 and H.R. 1743.* The Committee remains concerned about EPA's continuing trend of neglecting science funding and allocating resources away from ORD to OAR and other EPA program offices. These reallocations may affect the Agency's ability to perform thorough scientific research prior to implementing wide-ranging and expensive new regulations.

Finally, the Committee notes that in spite of repeated discussions and meetings with the EPA about the inadequacy of its budget information, the Agency has proved unwilling or unable to provide the Congress and the American people with the basic and fundamental information required to analyze its budget. The Committee finds it ironic that an Agency that claims to be expanding the "Public's Right-To-Know" either can not or will not provide such information.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

The stated mission of the National Oceanic and Atmospheric Administration (NOAA) is to describe and predict changes in the Earth's environment, and to conserve and manage the Nation's coastal and marine resources to ensure sustainable economic opportunities. NOAA conducts research to develop new technologies, improve operations, and supply the scientific basis for managing natural resources and solving environmental problems.

The NOAA programs for which the Science Committee has sole jurisdiction include the Office of Oceanic and Atmospheric Research (OAR) Climate and Atmospheric Programs, the National Weather Service (NWS), and the National Environmental Satellite, Data and Information Service (NESDIS). The Committee also shares jurisdiction with the Committee on Resources over the Office of National Ocean Service (NOS) Navigation Services, Ocean Resources and Conservation Assessment, and Acquisition of Data programs; the National Marine Fisheries Service (NMFS) Fisheries Research Vessels; OAR's Ocean and Great Lakes, National Undersea Research, and Sea Grant Programs; Program Support; Facilities; and the Office of Marine and Aviation Operations.

NOAA's total FY2001 request for budget authority is $1,977.6 million for those programs under the Science Committee's jurisdiction. This is an increase of $126.7 million—or 6.8 percent—above the FY2000 appropriation of $1,850.9 million and an increase of $57.3 million—or 3.0 percent—above total FY2001 level of $1,920.3 million authorized by P.L. 102-567 (NOAA Authorization Act of 1992), P.L. 105-160 (National Sea Grant College Program Reauthorization Act of 1998), the House-passed version of H.R. 1553 (National Weather Service and Related Agencies Authorization Act of 1999), the Science Committee's reported version of H.R. 1552 (Marine Research and Related Environmental Research and Development Programs Authorization Act of 1999), and the House-passed version of H.R. 2086 (Networking and Information Technology Research and Development Act).

Increases over the FY2000 appropriation include: (1) $17.2 million, or 9.2 percent, for NOS; (2) $12.4 million, or 4.1 percent, for OAR; (3) $53.3 million, or 8.1 percent for NWS; (4) $41.7 million, or 7.3 percent, for NESDIS; (5) $35.0 million, or 67.8 percent, for Program Support; and (5) $5.3 million, or 139.9 percent for Facilities. Decreases from the FY2000 appropriation include $35.1 million, or 68.3 percent, for NMFS; and $3.1 million, or 13.2 percent, for the Office of Marine and Aviation Operations.

Increases over the FY2001 authorized levels include: (1) $3.1 million, or 1.5 percent, for NOS; (2) $16.3 million for NMFS; (3) $2.6 million, or 0.8 percent, for OAR; (4) $23.2 million, or 3.4 percent for NWS; (5) $33.8 million, or 64.1 percent, for Program Support; (6) $3.4 million, or 59.2 percent, for Facilities; and (7) $0.2 million, or 1.2 percent, for the Office of Marine and Aviation Operations. Decreases from the FY2001 authorized levels includes $25.2 million, or 4.0 percent for NESDIS.

Of continuing concern to the Committee is the NWS modernization program, which has been underway for over 15 years at a cost of about $4.5 billion. The General Accounting Office (GAO) continues to identify this program as a high-risk area, and it has been the subject of a number of critical reports by the Department of Commerce Inspector General. The deployment and development of the observing systems associated with the NWS modernization are nearing completion. However, unresolved issues remain concerning the observing systems' operational effectiveness and efficient maintenance, such as performance problems with the new radars and ground-based sensors. In addition, GAO has noted that the NWS lacks a means to ensure that the modernized NWS systems provide promised returns on investment. GAO also found that NWS has not demonstrated that all proposed capabilities will result in mission improvements.

The Committee is also concerned about other programs that have been the subject of GAO and/or DOC IG reports, including the NOAA Fleet, the NOAA Corps, Polar Orbital Environmental Satellite funding, and procurement of follow-on Polar Orbital Environmental Satellites (GOES).

The Committee continues to question NOAA's plans to spend an additional $159.9 million over the three-year period FY 2002-2004 to purchase three additional NMFS Fisheries Research Vessels. For several years,

the GAO, the Commerce Department's Inspector General, and others have urged NOAA to pursue more cost-effective approaches to research and data collection. In the past few years, NOAA has increased its contracting with the private sector, universities, and other public entities. However, NOAA continues to rely greatly on its inefficient fleet that lacks the latest available technology, and to plan on replacing some of these older vessels. Continued Congressional oversight is needed to ensure that NOAA pursues more cost-effective acquisition of research data.

The Committee supports NOAA funding levels authorized either by current law or by House-passed or Committee-reported legislation. The Committee also notes that the requested increase of $23.2 million in FY2001 for NWS is more than offset by the requested decrease of $25.2 million for NESDIS and has no objection to redistributing NESDIS funds to NWS. The Committee does not support the requested increase for Program Support.

SUBCOMMITTEE ON SPACE AND AERONAUTICS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

The Administration's FY2001 proposal increases the agency's budget by $434.5 million, from a FY2000 funding level of $13,600.8 million to the FY2001 request of $14,035.3 million. For the first time in seven years, the Administration has requested an increase for the agency. In fact, the FY2001 request forecasts an increasing budget for NASA over the next five years. The Committee supports a stable budget for NASA that enables the agency to focus on its core missions including basic scientific research, human and robotic exploration of space, and advanced technology development.

The Committee is dedicated to building and operating the International Space Station, the largest international scientific project ever undertaken. This orbiting research laboratory will be used by scientists to conduct experiments in the unique space environment of microgravity. It will also provide a steppingstone to the future economic development of Earth orbital space and human space exploration beyond the Earth's orbit.

Unfortunately, for financial and other reasons, Russia has not met its commitments causing assembly of the International Space Station (ISS) to be delayed. Originally, the Space Station was supposed to begin assembly in November 1997. That date slipped by one year to November 1998. The first two elements of the Space Station have been mated and are currently in low Earth orbit. The third element, the Russian Service Module, originally scheduled for launch in April 1998 has been postponed repeatedly. The current estimate is a launch in the summer of 2000. The Russian Service Module is a crucial component as it provides the Station life support as well as navigation, guidance, and control. Thus, its delay causes a ripple effect throughout the entire assembly schedule. Therefore, the United States and the other international partners will be forced to endure continuing schedule delays and cost overruns until we end our dependence on Russia.

Since 1993, the Committee has supported limiting Russian participation to ISS enhancements rather than critical path components. The Committee's concerns about Russia's ability to meet its ISS commitments have been borne out. Eliminating a dependence on Russia is critically important to halt continuing delays, uncertainty, and cost growth. The Administration's budget request includes funding for an independent U.S. propulsion module and a U.S. crew return vehicle (CRV). To the maximum extent possible, these efforts must be accelerated so the U.S. can stem the rising costs of this project. The U.S. must have these capabilities in order to complete the Space Station, with or without the Russians.

A constant high priority for the Committee is the safe operation of the Space Shuttle. The Space Shuttle program has been aggressively reducing its operations costs since FY1992. A large part of the credit for the cost reduction effort is due to the ongoing consolidation of operations into a single prime contract. This contract, the Space Flight Operations Contract, was awarded to the United Space Alliance in October 1996. The contract provides for a phased approach to consolidating operations and all transitions are to be complete in FY2001. This year's request contains a significant increase in the budget for Shuttle upgrades. $256.4

million has been included in the FY2001 budget request to finance upgrades, which are to be introduced into the fleet of orbiters by 2005. The total Shuttle upgrades budget from FY2001 until FY2005 is $1,915.5 million. With such a significant increase to the Space Shuttle Upgrades budget, the Committee will closely monitor both the selection and the prioritization of upgrades performed to ensure that NASA selects the highest-priority safety and operability upgrades. The Committee will also closely monitor the upgrades program to ensure that Shuttle performance/life extension upgrades are not performed in the name of safety or operability.

The Committee supports the pursuit of basic research at NASA in the areas of space science and life and microgravity research. The Committee is pleased that the budget for Space Science is forecast for significant growth over the next five years. Despite recent failures in the Mars exploration program, the Committee remains committed to the concept of "faster, better, cheaper".

The Committee continues to be concerned about the fate of life and microgravity research. Space Station research is one of the first places that experiences reductions when Space Station development runs over budget. Until FY1997, the Office of Life and Microgravity Sciences and Applications was responsible for managing the science budgets for the ISS. Since that time, management of these resources has resided in the ISS office. This shift in management made it easier for the research money to be funneled to Space Station development because it does not require prior congressional approval. FY1999 appropriations directed NASA to transfer administrative responsibility for Space Station research back to the Office of Life and Microgravity Sciences and Applications, which NASA is doing. H.R. 1654, National Aeronautics and Space Administration Act of 1999, fences the research funding and includes provisions to pay back some of the funds that were raided previously for Space Station development. The provisions of H.R. 1654 will help to ensure the taxpayers receive maximum scientific return on their multi-billion dollar investment.

The Committee will monitor NASA's integration of the Aeronautics Research & Technology and Advanced Space Transportation Technology programs within the Office of Aero-Space Technology to ensure that there is no detrimental impact on the strategic plan goals of either program. The Committee intends to track the new focused programs relating to aeronautics, particularly those that seem to fall under the charter of the Federal Aviation Administration, rather than NASA.

One of the Committee's highest priority goals continues to be the reduction of the high cost of space transportation, particularly for passengers and cargo between the surface and Earth orbit. The Committee believes that this goal requires both the development of newer and more capable technologies and the development of a free and competitive market in launch services. When NASA initiated a Reusable Launch Vehicle (RLV) technology program in 1995, including its X-33 "Single Stage To Orbit" demonstration project, the Committee noted that because limited funding allowed for only one copy of one experimental RLV concept, it was not clear that this program would in fact lead to a commercially-developed RLV to meet NASA's space transportation needs. Problems in the X-33 program within the past year have borne out this concern, and the Administration has now proposed a $4.4 billion focused program for "2nd Generation RLV" technology risk reduction over FY2001-FY2005. This new effort's stated goal is to enable industry to competitively offer (in 2005) to develop systems that can provide commercial launch services to NASA (by 2010). While the Committee is generally supportive of this increase in funding, it will carefully monitor the evolving strategy and structure of this activity.

Committee oversight of the Earth Science Enterprise will continue to push for program accountability and a reduction in the significant cost overruns and program slips. The Committee notes with serious concern the continuing problems that plague this highly complicated program. AM-1, renamed Terra, was launched December 18, 1999. This followed a one year delay due to problems with the flight operations software. While the flight operation software has been replaced with a commercial alternative, the science processing software is still experiencing significant delays, and is not 100% capable despite Terra having already been launched. Moreover, Terra itself is experiencing problems with its flight operations which jeopardizes the satellite's ability to achieve its mission orbit. Unfortunately, these ongoing problems seem to justify the Committee's warnings about the unnecessary complexity of this program over the past 5 years. The Committee is also concerned with the Earth Science Enterprise's failure to implement commercial data

purchases as the "normal way of doing business" called out by NASA policy. Despite specific steps identified at a September 10, 1998 hearing that NASA testified it would investigate, virtually no progress has been made in making commercial data purchases routine.

OFFICE OF SPACE COMMERCIALIZATION

The Office of Space Commercialization, located in the Technology Administration at the Department of Commerce, is responsible for promoting commercial space activities. The FY2001 request is $664,000, an increase over the FY2000 funding level of $125,000.

OFFICE OF COMMERCIAL SPACE TRANSPORTATION

The Office of Commercial Space Transportation, located in the Federal Aviation Administration at the Department of Transportation, issues licenses to commercial space transportation providers. The FY2001 request is $12,607,000, a significant increase of $6,047,000 over the FY2000 funding level of $6,560,000 (as estimated by the FAA). The Committee notes the dramatic increase in the office's budget, and views this increase as consistent with the office's dramatically increased role and responsibilities in the commercial space transportation sector.

SUBCOMMITTEE ON TECHNOLOGY

TECHNOLOGY ADMINISTRATION/OFFICE OF TECHNOLOGY POLICY

The Committee on Science created the Technology Administration (TA) through legislation in 1988 (the Omnibus Trade and Competitiveness Act of 1988 (P.L. 100-48)). TA consists of the National Institute of Standards and Technology (NIST), including the Advanced Technology Program (ATP) and the Manufacturing Extension Partnership (MEP); the National Technical Information Service (NTIS); and the Office of the Under Secretary for Technology/Office of Technology Policy (OTP). The TA is headed by the Undersecretary for Technology who serves as the principal adviser to the Secretary of Commerce on Technology Policy.

The Committee is pleased that the Administration's FY2001 budget request does not include funding for the Experimental Program to Stimulate Competitive Technology (EPSCoT).

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

Scientific and Technology Research and Services (STRS)

The Science Committee supports improving the federal infrastructure required to promote technology development. Of primary importance are the core functions of the National Institute of Standards and Technology (NIST), which are carried out under the Scientific and Technology Research and Services (STRS) budget account. The functions include: measurement and standards research in the areas of electronics and electrical engineering, manufacturing engineering, chemical science and technology, physics, materials science and engineering, fire prevention, computer systems, applied mathematics, and scientific computing.

For FY2001, the Administration's request is $337 million for the STRS account, an increase of $55 million from the FY2000 level. The Committee believes that NIST laboratories are its most important scientific research function and is pleased that the FY2001 request funds all laboratory accounts at their FY2000 level of activity while including an increase for new initiatives. The Committee intends to review the account's new initiative in the area of computer security to assure it is consistent with H.R. 2413, the Computer Security Enhancement Act.

Unfortunately, the Committee is disappointed that while there is an overall increase requested for the STRS account, no funding has been requested to carry out activities in support of the Teacher Science and Technology Enhancement Initiative that was enacted in 1998 as part of P.L. 105-309.

Industrial Technology Services (ITS)

The Administration's Advanced Technology Program (ATP) request for FY2001 is an increase of $33 million over the FY2000 level. The request allows $65 million in new grants. The Committee recommends allocating sufficient funding to cover the existing mortgages for ATP. To date, the Department of Commerce has shown only anecdotal evidence that the program has yielded any benefit to United States competitiveness. Further, the Committee continues to be concerned that federal ATP grant money may simply be displacing private investment capital.

In their 1996 report, "Measuring Performance: The Advanced Technology Program and Private-Sector Funding," the General Accounting Office (GAO) indicated that more than half of ATP grant applicants did not look for private funding before applying for an ATP grant. At a 1998 hearing before the Science Committee, GAO testified that during the 1997 awards process, ATP grant applicants were not required to report their efforts to find private funding.

Since then, new ATP rules have been instituted by the Secretary of Commerce to address this issue. However, according to GAO's testimony, the new ATP regulations are unlikely to prevent private capital from being displaced because no supporting documentation is required from grant applicants.

While the Committee believes that the new ATP regulations are a step in the right direction, more needs to be done. The Committee continues to support the legislative revisions to the NIST Act, embodied in H.R. 1744, that will ensure that private capital is not displaced by public funding.

The Science Committee supports continuation of the Manufacturing Extension Partnership (MEP) program in FY2001.

NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)

NTIS is responsible for the collection and dissemination of scientific, technical, engineering, and other business-related information from federal and international sources. Declining sales attributed to increased consumer use of the Internet to obtain scientific information has raised doubts about NTIS' ability to remain self-sustaining in the future. This year, the Department of Commerce has requested a FY2000 supplemental appropriations transfer of $4.5 million from the Advanced Technology Program (ATP) to close NTIS. The Department of Commerce also proposes transferring NTIS' core archiving functions to the Library of Congress but has yet to send formal legislation to Congress to achieve this goal. The Committee does not support the seemingly dual-track approach the Department has employed in addressing the future of NTIS. Many questions remain about the Department's draft proposal to transfer NTIS' core archiving functions to the Library of Congress. Namely, the Department has failed to provide the Committee with cost estimates on the financial impact to the Library of Congress should their proposal be adopted. Lacking this information, the Committee remains concerned that the Department's plan will do little more than shift the financial needs of NTIS from the Executive to the Legislative branch. Until the Department of Commerce provides legislation and supporting documentation to Congress, the Committee will continue to express concerns with Administration's FY2000 supplemental request to terminate NTIS.

DEPARTMENT OF TRANSPORTATION (DOT)

Surface Transportation Research and Development

The Science Committee supports the Administration's budget request of $575 million for surface transportation research and development in FY2001. During the 105th Congress, the Committee passed H.R. 860, the Surface Transportation Research and Development Act of 1997. While many of its provisions were

incorporated into the Transportation Equity Act for the 21st Century (TEA-21), the recommended funding levels for research and development were significantly reduced. The Science Committee recognizes that sufficient funding for surface transportation research and development is essential to achieve an efficient, long-lasting and safe surface transportation system, and therefore supports increased funding for research consistent with the levels in the H.R. 860.

Federal Aviation Administration (FAA) Research and Development

The Science Committee recognizes that FAA research and development activities play an integral in developing new air traffic control and aviation safety technology. The Committee agrees with the General Accounting Office findings that certain delays in air traffic control modernization are directly traceable to weaknesses in the agency's research and development efforts. In addition, the Committee finds that the FAA needs to fully acknowledge the importance of research and development when determining annual budget levels.

The Committee continues its support for funding FAA R&D at the levels outlined in H.R. 1551, which passed by the House last year and is now part of the House and Senate Conference on H.R. 1000. H.R. 1551 authorized $256.2 million for FAA R&D in FY2001.

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1 *Unlocking Our Future:* Toward a New National Science Policy, 1998, p. 28
2 *Id.*

COMMITTEE ON SCIENCE VIEWS AND ESTIMATES FOR FY2001

MEMBER SIGNATURES

Chairman, The Honorable F. James Sensenbrenner, Jr.

The Honorable Sherwood L. Boehlert

The Honorable Lamar Smith

The Honorable Constance A. Morella

The Honorable Curt Weldon

The Honorable Dana Rohrabacher

The Honorable Ken Calvert

The Honorable Nick Smith

The Honorable Roscoe G. Bartlett

The Honorable Vernon J. Ehlers

The Honorable Dave Weldon

The Honorable Thomas W. Ewing

The Honorable Chris Cannon

COMMITTEE ON SCIENCE VIEWS AND ESTIMATES FOR FY2001

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The Honorable Merrill Cook

The Honorable Frank D. Lucas

The Honorable Mark Green

The Honorable Steven T. Kuykendall

The Honorable Jack Metcalf

The Honorable Judy Biggert

The Honorable Gary G. Miller

The Honorable Mark Sanford

The Honorable George Nethercutt

The Honorable Joe Barton

The Honorable Ralph M. Hall

The Honorable Mark Udall

The Honorable David Wu

The Honorable Joe Baca

The Honorable Jerry Costello

COMMITTEE ON SCIENCE VIEWS AND ESTIMATES FOR FY2001

MEMBER SIGNATURES

The Honorable Bart Gordon

The Honorable James Barcia

The Honorable Dennis Moore

The Honorable John Larson

The Honorable Bob Etheridge

The Honorable Sheila Jackson-Lee

Additional Views by the Honorable Curt Weldon

As Chairman of the Armed Services Committee on Military Research and Development, as well as a Member of the Science Committee, I believe that we must re-examine our priorities with regard to funding for research and development. We have not seen an increase in spending on defense R&D since 1993. While the President's budget proposes a 6 percent increase in civilian R&D in FY 2001, there are no increases for defense R&D throughout the five year run-out. By FY 2003, civilian R&D spending will have overtaken defense R&D spending. When adjusted for inflation, defense R&D will represent a decrease in funding for each year in the five year proposal, and in FY 2005 alone, there is over a 4 percent decrease.

Military R&D is crucial. Many projects that have been developed by the military have found applications in the private sector.

But even more important is the effect this has had on our Armed Forces. As has been often stated, we have unfortunately returned to the days of a hollow military, when spending cuts have decreased the size and readiness of our forces. The underfunding of military R&D is an often ignored but dire component of this. In this post-Cold War world, we are facing greater threats from rogue nations, terrorists, and the proliferation of Weapons of Mass Destruction. Our men and women in uniform need and deserve access to the best equipment possible as they face these threats, and research and development is a vital part of achieving this goal. We owe it to their personal security and our national security to develop these resources for them.

FY 2001 Budget

ADDITIONAL VIEWS:
DAVE WELDON

As the Representative who is fortunate enough to call "The Space Coast" his home, I have always been a proponent of strong, stable funding for America's space program. Unfortunately throughout most my years in Congress, the Clinton-Gore Administration has proposed to cut NASA's budget each year. The White House has waited until this year to finally provide and promote an increase in NASA's funding. Better late than never. I hope I can count on the Administration's support for this initiative and that they remain willing to work with us in Congress who are committed to the well being of NASA.

There are a few items I would like to include with the *Views and Estimates*:

- **Kennedy Space Center Construction of Facilities**

  For many Americans, the Kennedy Space Center is the most visible and notable NASA Center. It has been from this location that our most famous manned and unmanned space missions have departed. It has also been designated a center for launch technology and development by NASA. Unfortunately, much of KSC is saddled with aging infrastructure, equipment and facilities that were developed during our race to the Moon. The fact that we have holes in the roof of the famous Vehicle Assembly Building (VAB) where the Apollo Moon rockets and where our current Shuttle fleet is prepared to launch is a disgrace.

  We must make a commitment to KSC and address these problems before what are now minor inconveniences and minor embarrassments fester and evolve into malignancies that pose serious threats to the men and women who prepare our Shuttles for flight and those who fly them.

- **Commercialization Efforts**

  For years now, NASA has said that it wants to partner with the private sector. This means among many things, having business provide goods and services to NASA, thus freeing up NASA's tight resources in order to be focused on R&D.

  I urge NASA to continue to include more private sector growth in our space program. It is vitally important that NASA cultivate a loyal business community so as to ensure a loyal, engaged and vibrant community that is ready, willing, and able to do business on ISS when it is on orbit and operational

- **Ranges**

  Once the Service Module—or if needed the Interim Control Module (ICM)—is on orbit at ISS, there will be a significant ramp up in the number of Shuttle flights. We need to be prepared for the demands this increased flight rate will place not only on KSC, but the Eastern Launch Range itself. With KSC being designated the National Center of Launch Range Excellence, it can help alleviate the problems faced by the Range with new technology and techniques. I look forward to seeing KSC, the USAF and the users of the range work together to ensure robust, reliable and assured access to space for the military, civilian and private space ventures.

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The Honorable Judy Biggert

ADDITIONAL VIEWS AND ESTIMATES OF REPRESENTATIVE JUDY BIGGERT

While I share many of the thoughts expressed in the Science Committee's views and estimates for Fiscal Year 2001, I wanted to take this opportunity to provide additional comments on some issues of particular importance to me.

For decades, basic research has provided the foundation for our nation's progressive advances in science and technology. Our nation's commitment to scientific research has strengthened the United States' position as a world leader in technology, energy, medicine, and other fields.

It is for this reason that I believe the committee must ensure that we provide adequate resources to our national labs, including Argonne National Laboratory in my district. A renowned multiprogram laboratory, Argonne already represents a significant national investment in basic scientific research, as is evidenced by its expertise in basic energy sciences and its world class programs and user facilities. Argonne's premier science programs include materials science, chemistry, nuclear physics, and math and computer science.

These programs benefit from the presence of three major user facilities at Argonne: the Advanced Photon Source, the Intense Pulsed Neutron Source, and the Argonne Tandem-Linac Accelerator System. In particular, the Advanced Photon Source provides the world's brightest beams of X-rays for research. Basic research at the Advanced Photon Source is expected to lead to rapid practical advances in such fields as metals, ceramics, alloys, composite materials, catalysts, petrochemicals, computers, electronics, biology, medicine and pharmaceuticals.

Argonne's programs and user facilities are supported largely by DOE's Office of Science and the programs it administers. In particular, Argonne is engaged in important research work associated with Nuclear Physics, Basic Energy Sciences, Biological and Environmental Research, and Advanced Scientific Computing Research, among other things. Important national projects such as the Spallation Neutron Source, the National Nanotechnology Initiative, and the Rare Isotope Accelerator benefit from the research and development conducted at Argonne. This work often involves the development of highly advanced computer "technology tools" that allow scientists to model and analyze complex scientific problems and collaborate with other researchers. The usefulness of these advanced computer "technology tools" is dependent upon a strong information technology research program at the DOE.

Argonne also has made significant headway in addressing energy and waste issues associated with nuclear fission. The Electrometallurgical Treatment (EMT) program, in particular, involves the development of a treatment technology for DOE's most toxic nuclear waste. Some of this spent nuclear fuel contains metallic sodium, a material that can cause an explosion when brought into contact with water. Spent fuel with such characteristics will not be acceptable for storage and disposal in its current form and therefore must be treated. The DOE is responsible for the treatment and storage of approximately 8000 tons of spent nuclear fuel containing 2700 metric tons of uranium and transuranic elements from various civilian and defense-related programs.

Unfortunately, the president's Fiscal Year 2001 budget proposal for the Department of Energy did not contain sufficient funding for this program. A significant investment already has been made to address the treatment of spent nuclear fuel, but if funding for the EMT program is not restored, we will not capitalize on our investment. No other process exists, and no other research or development has been done, to treat this most dangerous and toxic nuclear waste, making the EMT technology uniquely important.

Congress, the Science Committee, the National Academy of Sciences, the National Research Council, and the DOE all have been monitoring and reviewing the development of this technology over the last three years of this demonstration project. The Science Committee approved an authorization of $85 million for the EMT program in Fiscal Year 2000, and $87.55 million in Fiscal Year 2001. The National Academy of Sciences and the National Research Council currently are completing their final assessment of the technology, and the DOE is finalizing its environmental impact statement. Both reports are expected to recommend that the DOE move from the demonstration of this technology to full utilization in treating 90 percent of DOE's spent nuclear fuel inventory and preparing it for proper storage. This expectation is based on status reports released to date by the National Research Council and the DOE.

In its spring 1998 status report on Argonne's research and development activity, the National Research Council stated, "Given the time and cost required to develop these processes as alternatives to Electrometallurgical treatment, none of these alternative processes could be implemented and validated without significant further R&D and "hot" demonstrations. This would result in increased costs and delays in processing of the Experimental Breeder Reactor-II spent nuclear fuel relative to Argonne's proposed schedule for complete processing of EBR-II fuel."

I share the Science Committee's commitment to substantial and sustainable funding increases for scientific research and development for Fiscal Year 2001 and the next five years. I believe it is the Science Committee's responsibility, as the committee of jurisdiction over science and energy programs, to emphasize basic, fundamental science and the importance of such research in addressing energy issues, especially those associated with nuclear energy. I look forward to working with the Science and Budget Committees, the administration, and the DOE to ensure adequate funding and continued oversight of the department's science and energy programs.

House Committee on Science Views and Estimates for Fiscal Year 2001
Additional Views of Representative Mark Sanford
February 29, 2000

I oppose the Science Committee's continued support for the International Space Station (ISS) in the Views and Estimates for FY 2001. Despite beginning construction of the ISS, we on the Committee, still have a responsibility to the taxpayers to make sure that this project is worth the investment. I would argue that it is not worth the investment for the simple reason that the total $96.5 billion price tag will not yield a significant scientific benefit. Instead, I believe that we should look towards the unmanned space program as better investment of scarce resources. The cost of the program is smaller, and I think we would see more benefit, in terms of space exploration and a better understanding of the universe in which we live. The investment is smaller in scope, but the scientific benefit is already tangible. According to the Congressional Budget Office, taxpayers would save as much as $70 billion by 2013 by terminating the ISS.

When President Reagan first proposed the Space Station in 1984, the original cost was a fraction of the latest cost estimates. However, by 1993, the General Accounting Office estimated the cost to be $118 billion. At the same time, NASA had already acknowledged a $1 billion cost overrun and the Clinton Administration directed the agency to redesign the project to cost less–including a shorter operational period. That new plan brought the Russians and other international partners into our fold.

The Russians, who are our major partners in the ISS, have been a major concern. I applaud the Committee for recognizing what a major obstacle the Russians are becoming to making the ISS even remotely successful. Even before President Yeltsin's resignation, I and many others voiced concerns about the instability of the government. Today, those problems are even greater, with financial scandal and internal fighting in Chechnya. No business in the private sector would stay committed to a partner who is on the verge of bankruptcy and is distracted by other pressing issues to remain committed to seeing the ISS to the end.

Even worse, despite being assured that the ISS would become "priority one" after the final Mir mission, the Russians are now looking to prop up the program even longer, bringing into serious doubt whether they can fulfill their ISS obligations. For over a year, we have patiently waited for Russia to launch the Service Module, a crucial element in constructing the ISS. Unfortunately, no timeline has been laid out and NASA is currently scrambling to find a solution.

We also face still rising costs to the construction of the ISS. In the 1993 redesign, NASA projected a $17.4 billion price tag for construction. The construction cost has now grown to $23.4 and $26 billion. Cost overruns are now becoming a problem again as NASA faces nearly an additional $1 billion in costs that they did not anticipate. Further delays by the Russians, or even worse, their withdrawal from the program could boost

costs over $100 billion. If we were to set spending priorities, such as reforming Social Security and Medicare or paying down the national debt, they would far outweigh the benefits of the ISS.

But what about other NASA programs? They also suffer from the growing costs of the ISS. Mission control, shuttle safety, and Mission to Planet Earth have all been raided to pay for the ISS. Almost $250 million has been diverted from the Space Station science accounts and $200 million has been shifted from the space shuttle payload and utilization operations. From FYs 1996-99, NASA has transferred $462 million from the International Space Station's scientific research to pay for construction costs–they are even cannibalizing within the Space Station.

In 1993, Congress killed the Super Conducting Super Collider because the ever-increasing costs made it harder and harder to justify continuing. Today, the Collider is a hole in the ground, but it represents that Congress can kill a boondoggle. It is time to stop another hole, this time in outer space, and stop funding the Space Station.

MINORITY ADDITIONAL VIEWS, FY2001

The decision to support the Majority's Views and Estimates is a difficult one because the report they offer fails to meet its fundamental legislative mandate: providing a five-year funding recommendation for those agencies under our jurisdiction. Even those of us who are supporting the report don't really know what we are endorsing because the report is silent on out-year funding. On balance, largely out of consideration for the courteous and bipartisan fashion in which the Chairman has managed the Committee, some of us have decided to sign onto the report with these additional views.

Contributing to our reluctance to sign on is a lengthy analysis which describes the President's healthy 6.2 percent FY2001 civilian R&D increase without embracing it and which criticizes the Administration's out-year funding (FY2002-2005) without suggesting what the Majority would do instead. In short, the Majority has adopted a critical tone without ever finding the voice to stake a clear position in opposition to the Administration.

For example, in expressing concern for the flat out-year funding in the President's budget, the Majority note that this "budget fails to meet the stable and sustainable funding criteria needed for science and technology programs in the out-years." This statement echoes a standard first espoused in the 1998 Science Policy Report produced by the Majority. However, neither that report, nor this Views and Estimates report, ever explains what is meant by the touchstone of "stable and sustainable funding." Optimistically, this could be interpreted as steady annual funding increases. But with multiple opportunities to just say that, in plain language, the Majority has never done so. Just as easily, this same standard could be a steady, predictable downward trend that leads to slowly declining budgets. In a tough fiscal environment of growing deficits, that would be an unsurprising (though disappointing) "stable and sustainable funding profile."

The report's criticism of the President's flat out-year request is also overstated for reasons that are all too obvious to anyone who has seen two or three budget cycles: out-years for most agencies are

always projected as flat or declining in real terms. This seems to be the result of OMB's machinations. Every Administration's budget states that out-year figures represent an administration's intention, but should not be considered binding at the agency or program level. Not surprisingly, many of the numbers in the FY2001 request have moved upward substantially from those in last year's budget for civilian R&D. The same will be true next year, and not simply because of the November election.

Notwithstanding these critiques, we are happy to see the Majority endorse the Administration's robust NSF request. Though the Committee has yet to take up a FY 2001 NSF authorization bill, we believe the President's request will receive strong support in Committee and we concur in the Majority's recommendation. This bill will also provide the Majority with the opportunity to propose some out-year increases for the steady and stable funding they advocate, although we were disappointed that the Majority failed to carve out a position on what those out-year amounts should be. We would suggest that, for the Budget Committee's purposes, increases to the FY2001 request at the rate of inflation projected for the out-years would be a reasonable first approximation pending action by the Science Committee on an authorization bill.

Where there are numbers in the Majority's report, they are largely those for FY2001 (and not for the out-years) endorsed in the authorization bills passed in the first session. Because we supported those authorizations, we certainly support those numbers. The use of Committee-adopted authorization numbers, coupled with the Chairman's fair treatment of the Minority, are the two considerations that allow us to sign on to the report. However, changes in scientific opportunities, administration priorities and fiscal conditions have set the stage for an administration request that may not always track with our authorized levels for FY2001. We respectfully ask that, unless the Administration can make a compelling case for deviation from our authorized levels, the Budget Committee generally treat our authorizations as the guide for funding of our agencies.

Finally, the Majority provides a great deal of detailed programmatic information to the Budget Committee. It is not clear to what purpose this information will be put since the Budget Committee works at such

a high level of aggregation, but many Minority Members of the Committee do not agree with the descriptions of certain programs in this report. It would be tedious for all concerned to read a long list of where we differ and why—not just on what is listed, but in what is left out. Further, we do not believe it would serve a constructive purpose for the Budget Committee's work.

One exception to this general observation is the Advanced Technology Program. The Majority's report suggests that ATP should be put on a funding path that freezes out new grants and simply funds existing grants. Inevitably, in the course of one or two more years, the program would shut down. This cannot be the Science Committee's position since the Committee has not completed work this Congress on H.R. 1744, the NIST authorization bill. We strongly disagree with the recommendation that the program be put in a death spiral. On ATP, we would encourage the Budget Committee to allocate enough space in the budget category that includes NIST to accommodate the Administration's request.

Despite our reservations towards the Majority's report, we support its substance, tempered by our constructive criticism and principled opposition to particular elements of that report. While we are not clairvoyant, we anticipate that Committee Democrats may carry the burden of creating a Views and Estimates report in the not-too-distant future. We expect some similar forbearance from our Republican colleagues in such future errors they feel we have stumbled into. We also hope that they would offer similarly constructive advice so as to improve our efforts should that responsibility fall to us.

Ralph M. Hall, MC
Jerry Costello, MC
Eddie Bernice Johnson, MC
Lynn Rivers, MC
Sheila Jackson Lee, MC
Bob Etheridge, MC
John Larson, MC
David Wu, MC
Dennis Moore, MC

Bart Gordon, MC
James A. Barcia, MC
Lynn Woolsey, MC
Mike Doyle, MC
Debbie Stabenow, MC
Nick Lampson, MC
Mark Udall, MC
Anthony Weiner, MC
Joe Baca, MC

Lynn N. Rivers

Additional Views and Estimates for FY2001
Lynn N. Rivers

While I join the Majority, and commend them for supporting the President's funding levels for R&D in fiscal year 2001, I wish to address the Majority's continued attack of the Advanced Technology Program (ATP), and my concerns regarding the future research and development activities of the Federal Aviation Administration as it relates to the environmental and noise related impacts of the industry.

The Majority's Views and Estimates claim Committee support for the proposed changes to ATP that are found in H.R.1744. This bill, while scheduled for mark-up on several occasions, has not been debated by either the Technology Subcommittee or the full committee. I am troubled that rather than bring this bill and its virtual death of ATP before the committee for full and open debate, the majority has chosen a back door method of garnering support.

ATP represents the importance, and success, of research partnerships between the federal government and industry. With economic growth as its goal, ATP spurs technological development in areas that may be too risky for industry to tackle alone. These are the projects that traditional venture capitalists tend to shy away from, but there is a view that this could have a big payoff for us as a Nation. These technologies create opportunities for new world class products, services and industrial processes, benefitting not just the ATP participants but other companies and industries, and ultimately taxpayers as well. By reducing the early stage R&D risks for individual companies, the ATP enables industry to pursue promising technologies which otherwise would be ignored or develop too slowly to compete in a rapidly changing world market.

A survey of ATP participants highlighted their belief that these technologies would not have been developed with the same speed were it not for the ATP program. Personally, I have spoken to many entrepreneurs who believe ATP to be invaluable. The reality is that for far too many corporations in this country R&D is now heavily D and very little R, and that is where the ATP program steps in. The importance of this program for technological development and our movement to the millennium are immeasurable.

While representing Detroit Metropolitan Airport in Romulus, I have witnessed first hand the negative impacts on the environment and the quality of life for those living around the airport. I am concerned with FAA's push to increase the national airspace capacity without pushing for more research into the effects of such measures with equal vigor. In recent testimony before the Technology Subcommittee Robert Doll, the chair of the FAA's Research, Engineering and Development Advisory Committee (REDAC) stated:

The REDAC reiterates that the system capacity issue involves more than just the efficient use of the airspace. Unless airport facility issues, ground handling issues and noise and emission issues are pursued with equal vigor, the system will not be able to meet traveler's demands in the very near future...The public will not tolerate the increasing depletion of the environment.

Despite FAA's FY2001 request, which more than doubles funding for this research, I do not believe the FAA is as equally committed to solving these problems as they are to expanding the national airspace capacity. Our constituents living near airports desperately need relief now. It is unacceptable to talk about increasing air traffic, which increases the burden of those living around the airport, without equally discussing ways to alleviate the impact this increase will have on them.

Joe Baca

ADDITIONAL VIEWS
OF REPRESENTATIVE JOE BACA
VIEWS AND ESTIMATES FOR FISCAL YEAR 2001

I support the Clinton Administration's proposal to increase funding for scientific and medical research by nearly $3 billion.

This initiative launches us into the 21st Century by sustaining what America has always excelled at, scientific and biomedical research. The Inland Empire region in California will benefit greatly with many of our local educational institutions - such as UC Riverside - leading the way.

The Clinton proposal will add $2.8 billion in the Fiscal Year 2001 budget and includes an increase of $1 billion for biomedical research in areas such as diabetes, brain disorders, cancer, and disease prevention. Nearly a half-billion dollars will go towards the development of basic research in nanotechnology, the design and fabrication of devices of ultramicroscopic size.

America's advances in technology and the explosion of the information age has brought about unprecedented growth and prosperity. This initiative will help spur continued economic growth and provide better health for Americans.

The balance of funding for the Clinton Administration's "21st Century Research Fund" includes an additional $675 million for the National Science Foundation, nearly doubling funding from past years, and over $500 million for information technology research.

As a member of the Science Committee, I believe we need to meet the challenges of the 21st Century. We need to be prepared to lead the world into the future. The Administration's proposal heads us in the right direction.

Lynn Woolsey

ADDITIONAL VIEWS AND ESTIMATES
FY2001

REP. LYNN WOOLSEY (D-CA)

The views and estimates of the House Committee on Science represents many positions on which I agree with my colleagues. However, I feel that funding for the International Space Station casts too large a shadow over other priorities that need to be funded at higher levels, such as education, health care, the protection of our environment, as well as the space science and aeronautics programs at NASA. I also believe that we should invest more in the research and development of alternative and renewable energy sources. Viewed in this context, the International Space Station is too expensive and its cancellation would free up much needed resources for Fiscal Year 2001 and beyond.

*=Pending publication as of December 2000.

Date	Committee on Science List of Hearings with Publication Numbers plus List of Legislative Reports filed in the 106th Congress	Number
Jan. 20, 1999	The Year 2000 Problem: Status Report on the Federal, State, Local, and Foreign Governments (Joint Hearing before the Committee on Government Reform and the Committee on Science)	106-42
Feb. 11, 1999 *Webcast	Fiscal Year 2000 NASA Authorization, Parts I-V (Hearing before the Subcommittee on Space and Aeronautics)	106-8
Feb. 11, 1999 *Webcast	Review of the Fiscal Year 2000 Budget Request for the Technology Administration (Hearing before the Subcommittee on Technology)	106-1
Feb. 23, 1999 *Webcast	The Impact of Y2K: Can the Postal Service Still Deliver (Joint Hearing before the Subcommittee on Government Management, Information and Technology, Committee on Government Reform and the Subcommittee on Technology, Committee on Science)	106-35
Feb. 23, 1999 *Webcast	National Earthquake Hazards Reduction Program Reauthorization (Hearing before the Subcommittee on Basic Research)	106-17
Feb. 24, 1999 *Webcast	Fiscal Year 2000 NASA Authorization, Parts I-V (Hearing before the Subcommittee on Space and Aeronautics)	106-8
Feb. 24, 1999 *Webcast	Fiscal Year 2000 Budget Authorization Request: National Oceanic and Atmospheric Administration And NOAA Fleet Maintenance and Planning, Aircraft Services, and NOAA Corps (Hearing before the Subcommittee on Energy and Environment)	106-30

Feb. 25, 1999 *Webcast	Unscrewing the Fastener Quality Act (Hearing before the Subcommittee on Technology)	106-2
Feb. 25, 1999 *Webcast	Fiscal Year 2000 NASA Authorization, Parts I-V (Hearing before the Subcommittee on Space and Aeronautics)	106-8
Mar. 2, 1999 *Webcast	Oversight of the Year 2000 Problem at the Department of Defense: How Prepared is Our Nation's Defense? (Joint Hearing before the Subcommittee on Technology, Committee on Science and the Subcommittee on Government Management, Information and Technology, Committee on Government Reform)	106-47
Mar. 3, 1999 *Webcast	Fiscal Year 2000 Department of Energy Budget Authorization Request: Parts I and II (Hearing before the Subcommittee on Energy and Environment)	106-69
Mar. 3, 1999 *Webcast	Fiscal Year 2000 NASA Authorization, Parts I-V (Hearing before the Subcommittee on Space and Aeronautics)	106-8
Mar. 4, 1999 *Webcast	Funding Requirements for FAA Research and Development (Hearing before the Subcommittee on Technology)	106-4
Mar. 9, 1999 *Webcast	The Impact of Litigation on Fixing Y2K (Joint Hearing before the Subcommittee on Technology, Committee on Science and the Subcommittee on Government Management, Information and Technology, Committee on Government Reform)	106-3
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