Union Calendar No. 502

108th Congress, 2d Session – – – – – – – – – – – – – –House Report 108–817

SUMMARY OF ACTIVITIES

OF THE

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

FOR THE

ONE HUNDRED EIGHTH CONGRESS

JANUARY 3, 2005

JANUARY 3, 2005.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

SUMMARY OF ACTIVITIES OF THE COMMITTEE ON SCIENCE

Union Calendar No. 502

108th Congress, 2d Session – – – – – – – – – – – – – – – House Report 108–817

SUMMARY OF ACTIVITIES

OF THE

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

FOR THE

ONE HUNDRED EIGHTH CONGRESS

JANUARY 3, 2005

JANUARY 3, 2005.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

U.S. GOVERNMENT PRINTING OFFICE

97–452 WASHINGTON : 2005

COMMITTEE ON SCIENCE

HON. SHERWOOD L. BOEHLERT, New York, *Chairman*

RALPH M. HALL, Texas
LAMAR S. SMITH, Texas
CURT WELDON, Pennsylvania
DANA ROHRABACHER, California
KEN CALVERT, California
NICK SMITH, Michigan
ROSCOE G. BARTLETT, Maryland
VERNON J. EHLERS, Michigan
GIL GUTKNECHT, Minnesota
GEORGE R. NETHERCUTT, JR., Washington
FRANK D. LUCAS, Oklahoma
JUDY BIGGERT, Illinois
WAYNE T. GILCHREST, Maryland
W. TODD AKIN, Missouri
TIMOTHY V. JOHNSON, Illinois
MELISSA A. HART, Pennsylvania
J. RANDY FORBES, Virginia
PHIL GINGREY, Georgia
ROB BISHOP, Utah
MICHAEL C. BURGESS, Texas
JO BONNER, Alabama
TOM FEENEY, Florida
RANDY NEUGEBAUER, Texas
VACANCY

BART GORDON, Tennessee, RMM*
JERRY F. COSTELLO, Illinois
EDDIE BERNICE JOHNSON, Texas
LYNN C. WOOLSEY, California
NICK LAMPSON, Texas
JOHN B. LARSON, Connecticut
MARK UDALL, Colorado
DAVID WU, Oregon
MICHAEL M. HONDA, California
BRAD MILLER, North Carolina
LINCOLN DAVIS, Tennessee
SHEILA JACKSON LEE, Texas
ZOE LOFGREN, California
BRAD SHERMAN, California
BRIAN BAIRD, Washington
DENNIS MOORE, Kansas
ANTHONY D. WEINER, New York
JIM MATHESON, Utah
DENNIS A. CARDOZA, California
VACANCY
VACANCY
VACANCY

SUBCOMMITTEE ON ENERGY

JUDY BIGGERT, Illinois, *Chair*

RALPH M. HALL, Texas
CURT WELDON, Pennsylvania
ROSCOE G. BARTLETT, Maryland
VERNON J. EHLERS, Michigan
GEORGE R. NETHERCUTT, JR., Washington
W. TODD AKIN, Missouri
MELISSA A. HART, Pennsylvania
PHIL GINGREY, Georgia
JO BONNER, Alabama
+SHERWOOD L. BOEHLERT, New York

JOHN B. LARSON, Connecticut
NICK LAMPSON, Texas
JERRY F. COSTELLO, Illinois
LYNN C. WOOLSEY, California
DAVID WU, Oregon
MICHAEL M. HONDA, California
BRAD MILLER, North Carolina
LINCOLN DAVIS, Tennessee

+BART GORDON, Tennessee

SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS

VERNON J. EHLERS, Michigan, *Chairman*

NICK SMITH, Michigan
GIL GUTKNECHT, Minnesota
JUDY BIGGERT, Illinois
WAYNE T. GILCHREST, Maryland
TIMOTHY V. JOHNSON, Illinois
MICHAEL C. BURGESS, Texas
VACANCY
+SHERWOOD L. BOEHLERT, New York

MARK UDALL, Colorado
BRAD MILLER, North Carolina
LINCOLN DAVIS, Tennessee
BRIAN BAIRD, Washington
JIM MATHESON, Utah
ZOE LOFGREN, California

+BART GORDON, Tennessee

SUBCOMMITTEE ON RESEARCH

NICK SMITH, Michigan, *Chairman*

LAMAR S. SMITH, Texas	EDDIE BERNICE JOHNSON, Texas
DANA ROHRABACHER, California	MICHAEL M. HONDA, California
GIL GUTKNECHT, Minnesota	ZOE LOFGREN, California
FRANK D. LUCAS, Oklahoma	DENNIS A. CARDOZA, California
W. TODD AKIN, Missouri	BRAD SHERMAN, California
TIMOTHY V. JOHNSON, Illinois	DENNIS MOORE, Kansas
MELISSA A. HART, Pennsylvania	JIM MATHESON, Utah
PHIL GINGREY, Georgia	SHEILA JACKSON LEE, Texas
RANDY NEUGEBAUER, Texas	VACANCY
VACANCY	
+SHERWOOD L. BOEHLERT, New York	+BART GORDON, Tennessee

SUBCOMMITTEE ON SPACE AND AERONAUTICS

DANA ROHRABACHER, California, *Chairman*

RALPH M. HALL, Texas	NICK LAMPSON, Texas
LAMAR S. SMITH, Texas	JOHN B. LARSON, Connecticut
CURT WELDON, Pennsylvania	MARK UDALL, Colorado
KEN CALVERT, California	DAVID WU, Oregon
ROSCOE G. BARTLETT, Maryland	EDDIE BERNICE JOHNSON, Texas
GEORGE R. NETHERCUTT, JR., Washington	SHEILA JACKSON LEE, Texas
	BRAD SHERMAN, California
FRANK D. LUCAS, Oklahoma	DENNIS MOORE, Kansas
J. RANDY FORBES, Virginia	ANTHONY D. WEINER, New York
ROB BISHOP, Utah	VACANCY
MICHAEL BURGESS, Texas	VACANCY
JO BONNER, Alabama	VACANCY
TOM FEENEY, Florida	
VACANCY	
+SHERWOOD L. BOEHLERT, New York	+BART GORDON, Tennessee

***Ranking Minority Member appointments/Full Committee and Subcommittee assignments.**

****Vice Chair appointments/Full Committee and Subcommittee assignments.**

+ The Chairman and Ranking Minority Member shall serve as Ex-officio Members of all Subcommittees and shall have the right to vote and be counted as part of the quorum and ratios on all matters before the Subcommittees.

LETTER OF TRANSMITTAL

House of Representatives,
Committee on Science
Washington, DC
January 4, 2005

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 108TH 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,

SHERWOOD L. BOEHLERT.
Chairman

Enclosure

CONTENTS

Summary of Activities
Committee on Science
108th Congress, 2003–2004

Union Calendar No. 502

108th Congress
2d Session
HOUSE OF REPRESENTATIVES
REPORT
108–817

SUMMARY OF ACTIVITIES—COMMITTEE ON SCIENCE

JANUARY 3, 2005.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

---

MR. BOEHLERT, from the Committee on Science, submitted the following

R E P O R T

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 (NASA) 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—astro-

nautical research and development, scientific research and development, science scholarships, and legislation relating to scientific agencies, especially the National Bureau of Standards[1], NASA, 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 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 nine very talented and distinctly different chairmen, each very creative in his own way in directing the Committee's activities.

Representative 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

[1] Now named the National Institute of Standards and Technology (NIST) (P.L. 100–418, Title V, Part B, Subpart A, Sections 5111 through 5163, enacted August 23, 1988.)

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 Representative 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, Representative 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 long-standing Member of Congress and Chairman of the Veterans Committee before assuming 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 and was succeeded as Chairman by Representative Don Fuqua of 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 Ranking Minority Member Robert Roe, 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 eight 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 research programs for renewable and alternative energy sources, a national hydrogen research and development program was established. The mission of the program was to foster the economic production of hydrogen from renewable resources to 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.

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 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 and he tenaciously stuck to those 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 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 the official name of the Committee from the Committee on Science, Space, and Technology to the Committee on Science. Representative 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 its ranking minority 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 the 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 another change in leadership to the Committee. Representative F. James Sensenbrenner, Jr., a Republican from Wisconsin, became the eighth Chairman after Chairman Walker retired from Congress. Sensenbrenner had

been a Member of the Committee since 1981 and prior to his appointment as Committee head, he served as Chairman of the Subcommittee on Space and Aeronautics.

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

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 (December, 1997), Buenos Aires (November, 1998), and The Hague (November, 2000) global warming conferences. Under Chairman Sensenbrenner's leadership, the Committee examined the science supporting the Kyoto Protocol and the economic impacts the treaty could have on the Nation.

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 Representative Constance Morella of Maryland, 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. Thankfully, the U.S. and the world experienced very minor problems associated with the Y2K rollover.

Over many years, and during the tenure of several chairmen, the Science Committee closely monitored development of the International Space Station. In October of 2000, a crew of American and Russian astronauts became the first inhabitants of the space station.

One of Chairman Sensenbrenner's priorities was to achieve a steady and sustained growth in Federal R&D investments. During his tenure, funding for civilian Federal R&D increased by 39 percent. Funding for the National Science Foundation increased 23 percent, including its highest ever appropriation in FY 2001.

The start of the 107th Congress brought another change in the Committee's leadership. Representative Sensenbrenner was elected Chairman of the Judiciary Committee and on January 3, 2001, Representative Sherwood L. Boehlert from New York's 23rd Congressional District became the new Chairman of the Committee on Science.

Boehlert had served on the Science Committee since first taking office in 1983 and had earned a reputation for independence, moderation and thoughtful leadership. In his first speech as Chairman, Boehlert pledged to "build the Science Committee into a significant force within the Congress," and "to ensure that we have a healthy,

sustainable, and productive R&D establishment—one that educates students, increases human knowledge, strengthens U.S. competitiveness and contributes to the well-being of the Nation and the world."

With those goals in mind, Boehlert laid out three priorities for the Committee—the *Three E's:* science and math education, energy policy and the environment—three areas in which Boehlert believed the resources and expertise of the scientific enterprise could be brought to bear on issues of national significance. Under Boehlert's leadership, the Committee succeeded in getting important legislation on these and other priority areas signed into law.

Boehlert also reorganized the Subcommittees to reflect these new priorities. The four Subcommittees became Research; Energy; Environment, Technology, and Standards; and Space and Aeronautics.

In the energy realm, the Committee unanimously approved the research and development portions of the House-passed Energy bill (H.R. 4). Committee provisions were designed to reduce U.S. dependence on foreign oil by investing in energy efficiency, renewable energy technologies, improved nuclear energy technologies, and new fossil fuel technologies, including clean coal.

On education, the Committee saw its major initiatives in both K–12 and undergraduate education signed into law as part of H.R. 4664, the National Science Foundation Authorization Act of 2002. Among the education initiatives were the Committee's version of President George W. Bush's proposal to establish National Mathematics and Science Partnerships that will put our nation's universities and businesses to work to help improve science and math education.

On the environment, the Committee passed legislation strengthening science at the Environmental Protection Agency and brought attention to the science behind several controversial issues, including arsenic in drinking water, particulate air pollution and global climate change.

After the terrorist attacks on September 11, 2001, terrorism moved to the forefront of the Committee's agenda. Heeding Chairman Boehlert's admonition that "the war on terrorism will be won in the laboratory as much as on the battlefield," the Science Committee worked to ensure that the Federal Government was investing in the science and technology necessary to combat terrorism over the long-term.

The Committee first turned its attention to cyberterrorism. Boehlert's legislation to address these challenges had broad bipartisan support in Congress, and on November 27, 2002, the Cyber Security Research and Development Act was signed into law.

Under Boehlert's leadership, the Committee also took the lead in responding to the concerns of family members of September 11th victims, regarding the investigation into the collapse of the World Trade Center. After two high-profile hearings into the matter, the Committee introduced legislation to enable the government to respond more quickly to building failures and to overcome the problems that plagued the World Trade Center investigation. Signed into law on October 1, 2002, the legislation gives the National Institute of Standards and Technology jurisdiction over all future building failure investigations and the requisite authority to conduct such investigations unimpeded.

The Committee also played a key role in the development of legislation establishing the Department of Homeland Security, and led the push to make science and technology a priority in the new department. Committee proposals creating an Under Secretary in charge of science and technology, and a Homeland Security Advanced Research Projects Agency were included in the final legislation, signed into law on November 22, 2002.

The Committee also held hearings on how to strike the proper balance between the need for openness to conduct research successfully and the need for secrecy to protect homeland security.

Finally, continuing the six-decade commitment of the Science Committee "to maintain American preeminence in science and technology," the Committee successfully enacted legislation that sets the National Science Foundation (NSF) on a path to doubling its budget over five years. Chairman Boehlert and Subcommittee on Research Chairman Nick Smith of Michigan led the bipartisan, bicameral effort to ensure that future generations will continue to reap the benefits of NSF's invaluable basic research.

In the 108th Congress, the Science Committee focused its attention on charting space and ocean policy, strengthening the U.S. economy by promoting research and innovation, and enabling the U.S. to better respond to terrorism and other emergencies by helping first responders.

Less than two months into the 108th Congress, the Space Shuttle *Columbia,* with her crew of seven, broke apart during re-entry into Earth's atmosphere. This national tragedy renewed debate over the future of human space exploration. The Committee held several high profile hearings into the cause of the accident and exercised close oversight of the proceedings of the *Columbia* Accident Investigation Board (CAIB), the independent investigative body convened by the National Aeronautics and Space Administration (NASA) to determine the cause of the accident.

Since the CAIB report was issued in August 2003, the Committee actively oversaw NASA's return-to-flight activities, particularly the implementation of the CAIB recommendation to establish an Independent Technical Authority at NASA. The Committee also closely monitoring the cost of return-to-flight activities, and issues related to future Shuttle flights, including whether to launch a Shuttle mission to repair the Hubble Space Telescope.

The *Columbia* accident also prompted the President to issue a new vision for NASA—to return humans to the Moon and continue with a manned mission to Mars. Since that announcement, the Committee has held hearings and numerous briefings to evaluate the President's plan. Chairman Boehlert applauded the President for giving NASA a clear vision for the future, but also raised questions about the funding of the proposal and about its potential impact on NASA's work in Space and Earth Science and aeronautics.

The Committee also passed two key bills related to NASA and space flight, both of which were signed into law. The *NASA Flexibility Act of 2004,* introduced by Chairman Boehlert, gives NASA new personnel tools to attract and retain a top-notch technical workforce. The *Commercial Space Launch Amendments Act of 2004,* introduced by Space Subcommittee Chairman Dana Rohrabacher of California, creates a regulatory regime at the Federal Aviation Administration for the commercial human space flight in-

dustry, designed to encourage that industry's development while providing information on the inherent risks in space tourism and limiting that risk, as appropriate.

While the Committee was engaged in space policy, it was also leading efforts to revamp ocean policy. In May, 2004, Boehlert convened the first hearing in the House on the Preliminary Report of the U.S. Commission on Ocean Policy. The report described an oceanic ecosystem that is fragile, threatened, and in dire need of national attention and commitment.

Among the more than 200 recommendations included in the report was a recommendation to pass an organic act for the National Oceanic and Atmospheric Administration, which would clearly define and codify the agency's mission and functions. Representative Vernon Ehlers of Michigan, the Chairman of the Subcommittee on Environment, Technology, and Standards, introduced such legislation and held a hearing on it.

Recognizing that innovation is the key to U.S. economic success, the Committee also focused its efforts on strengthening the U.S. research enterprise and American industry. In December 2003, President Bush signed into law Chairman Boehlert's *21st Century Nanotechnology Research and Development Act,* which authorized a better funded and coordinated interagency program in nanotechnology—an emerging field of science that the National Science Foundation estimates will be a $1 trillion industry within the next decade.

The President also signed into law the Department of Energy *High-End Computing Revitalization Act,* which was introduced by Energy Subcommittee Chairman Judy Biggert of Illinois. The Act will foster research to improve U.S. supercomputers and make them more available to U.S. researchers.

Other Committee efforts to improve the economy included the *Harmful Algal Bloom and Hypoxia Research and Control Act,* which will help combat a problem that costs U.S. fisheries millions of dollars; and the *National Windstorm Impact Reduction Act,* which sets up a new interagency program to find ways to limit damage caused by windstorms and which also reauthorizes the National Earthquake Hazards Reduction Program, which has been successfully discovering ways to limit earthquake damage since 1977. Both bills were signed into law. The algal bloom legislation was sponsored by Chairman Ehlers and the windstorm bill by Congressman Randy Neugebauer, a Republican from Texas. The earthquake legislation began life as a separate bill introduced by Michigan Representative Nick Smith, Chairman of the Subcommittee on Research.

Several other measures to help the economy were passed by the House, including the *Manufacturing Technology Competitiveness Act,* introduced by Chairman Ehlers, and the *Green Chemistry Research and Development Act,* introduced by Republican Representative Phil Gingrey of Georgia.

As important as any legislation was the Committee's effort to ensure that unnecessary visa delays did not discourage the world's top students and researchers from becoming part of the U.S. research enterprise. In a series of hearings and through a Government Accountability Office study, the Committee led a successful effort to reduce the waiting time for visas. Chairman Boehlert

pointed out repeatedly that casting too wide a net in the visa process hurt America's research capacity while doing little to catch terrorists because the effort was not appropriately targeted.

Terrorism was also on the Committee's mind in other ways. The Committee continued its close oversight of research and development at the Department of Homeland Security, particularly in the area of cyber security.

The terrorist attacks of September 11, 2001 also highlighted the critical role of our nation's first responders. Two pieces of Committee legislation were enacted into law that would bolster federal support for U.S. fire and emergency medical services. The *Staffing for Adequate Fire and Emergency Response Act* established a new program to provide grants to help fire departments hire firefighters. The *Assistance to Firefighters Grant Reauthorization Act of 2004* increased funding for the FIRE grant program—which provides competitively awarded grants directly to fire departments for the purchase of needed equipment, vehicles and training—and broadened the eligibility requirements to allow emergency medical services to also apply for the grants.

Chapter I—Legislative Activities of the Committee on Science

1.1—P.L. 108–11, Emergency Wartime Supplemental Appropriations Act, 2003 (H.R. 1559)

[Legislative note: Title III of H.R. 1559 contains provisions of H.R. 1297, Columbia Orbiter Memorial Act.*]*

Background and Summary of Legislation

Title III of H.R. 1559, the *Emergency Wartime Supplemental Appropriations Act of 2003,* includes provisions initially introduced as H.R. 1297, the *Columbia Orbiter Memorial Act.* These provisions direct the Secretary of the Army to construct in Arlington National Cemetery, Virginia, a memorial marker honoring the seven members of the crew of the *Columbia* Orbiter who died on February 1, 2003, during the landing of Space Shuttle mission STS–107. Additionally, it authorizes the Administrator of the National Aeronautics and Space Administration to: (1) accept gifts and donations for that or another memorial or monument to the crew; and (2) transfer any donations accepted to the Secretary of the Army for the Arlington National Cemetery memorial.

Legislative History

H.R. 1297, *Columbia Orbiter Memorial Act* was introduced on March 13, 2003, and referred to the Committee on Veterans' Affairs and the Committee on Science. The bill was sponsored by Mr. Young of Florida, along with twenty co-sponsors from both sides of the aisle, and established a memorial at the Arlington National Cemetery to honor the Space Shuttle *Columbia* astronauts that perished on February 1, 2003. On March 26, 2003, the Committee on Science marked up the bill and ordered the measure reported, without amendment, by a voice vote. The Committee on Veterans' Affairs considered the measure on April 3, 2003 and ordered it reported, as amended, by unanimous consent. The Committee on Veterans' Affairs filed H.Rept. 108–62, Part 1 on H.R. 1297 and the Committee on Science discharged the measure on April 8, 2003.

Provisions of H.R. 1297, *Columbia Orbiter Memorial Act* were incorporated into Title III of H.R. 1559, *Emergency Wartime Supplemental Appropriations Act, 2003* which was signed by the President on April 16, 2003 and became Public Law 108–11.

1.2—P.L. 108–136, NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2004 (H.R. 1588/S. 1060)

[Legislative note: A modified version of H.R. 1118, Staffing for Adequate Fire and Emergency Response Firefighters Act of 2003 *was incorporated into P.L. 108–136.]*

Background and Summary of Legislation

On July 16, 2003, the Speaker appointed Science Committee Chairman Sherwood Boehlert, Subcommittee on Research Chairman Nick Smith, and Science Committee Ranking Minority Member Ralph Hall as additional conferees to H.R. 1588, the *National Defense Authorization Act for Fiscal Year 2004,* for consideration of Sections 852 and 911 of the Senate amendment, and modifications committed to conference.

These conference committee deliberations, contained in H.Rept. 108–354 (conference report to accompany H.R. 1588), resulted in the enactment of Sections 852 and 911 of the *National Defense Authorization Act for Fiscal Year 2004,* which was signed into law by the President on November 24, 2003. Descriptions of those provisions follow.

Section 852—Making Fighting Fires SAFER

The Senate amendment, passed on May 22, 2003, contained a provision authorizing the Department of Homeland Security to establish a program of grants to fire departments for the purpose of hiring new firefighters. The amendment was a modified version of S. 544, which was companion legislation to H.R. 1118, introduced by Chairman Boehlert. The House bill contained no similar provision.

The purpose of the program authorized by the amendment (and its corresponding legislation) is to help communities across America meet new minimum staffing standards for the fire services so they have adequate manpower to protect against fires, acts of terrorism, and other hazards. A similar federal hiring program to increase the number of police officers protecting America's communities exists within the Department of Justice.

The authorization language, as amended in its final form, authorizes $7.6 billion over seven years for the U.S. Fire Administration to award grants to fire departments to pay the salaries and benefits for three years for each new firefighter. Under the language, all fire departments, volunteer and career, would be eligible to apply. The grants are for a four-year period, and must not exceed a total of $100,000 per firefighter. They require an overall non-federal match minimum of 37.5 percent (10, 20, 50, and 70 percent in years 1–4 of the grant, respectively, to phase down local government dependence on the Federal Government), and recipients are required to retain new hires for at least one year following the conclusion of federal funding.

The legislation also explicitly allows volunteer fire departments, which are also facing significant personnel shortfalls, to supplement their volunteer force with full-time firefighters. This is provided through a mechanism in which ten percent of the total

amount appropriated for SAFER is reserved for recruitment and retention grants to enhance the number of volunteer firefighters and at least ten percent of the remaining funds are guaranteed for hiring firefighters at volunteer and majority volunteer departments. Any unused amounts are transferred to the recruitment and retention grants. (For example, if $1 billion is appropriated in Fiscal Year 2005, $100 million will be set aside for volunteer/majority volunteer recruitment and retention grants, and an additional $90 million would be reserved for hiring firefighters at volunteer/majority volunteer departments.)

Section 911—Coordination of Space Science and Technology Activities of the Department of Defense

The Senate amendment included language that directs the Secretary of Defense to develop and implement a space science and technology strategy and to annually review and, as appropriate, revise such strategy. The section also requires such strategy to be included as part of the annual National Security Space Plan and requires the Comptroller General to review the strategy and report on its results to the defense committees.

1.3—P.L. 108–153, 21ST CENTURY NANOTECHNOLOGY RESEARCH AND DEVELOPMENT ACT (S. 189/H.R. 766)

Background and Summary of Legislation

Nanotechnology is the science of manipulating and characterizing matter at the atomic and molecular level. It is one of the most promising and exciting areas of science today, involving a multitude of science and engineering disciplines, with widespread applications in electronics, advanced materials, medicine, and information technology. For example, nanotechnology likely represents the future of information processing and storage, as further advances in computer chips and magnetic disk drive components will increasingly depend on nanotechnology innovations. A variety of nanotechnology products are already in development or on the market, and experts agree that more revolutionary products will emerge from nanotechnology research currently underway. Large companies are investing in nanotechnology development programs, and many small start-up companies have been founded to develop new technologies and new products based on breakthroughs in the understanding of materials at the atomic and molecular level.

The promise of nanotechnology to accelerate technological change has prompted some to advise caution about pursuing rapid innovation without a better understanding of where it might lead us. For example, one of the more salient concerns is the possible environmental or health impact of nanotechnology materials. Nanoscale particles, or nanoparticles, because of their small size, may readily enter living systems with potentially toxic results. While few comprehensive studies have been completed, early research suggests that some materials derived through nanotechnology may be biologically inert and thus pose little threat. Nonetheless, new materials can interact with the environment or with living systems in unexpected ways. Studies of the environmental impacts as well as of societal and ethical questions associated with the adoption of

these new technologies are needed, and the research community should be prepared to respond to legitimate questions about the consequences of new products based on nanotechnology.

The National Nanotechnology Initiative (NNI) is a government-wide research initiative involving 10 federal agencies. The initiative has grown rapidly from an initial budget of $464 million in fiscal year 2001 to the $849 million requested for fiscal year 2004. In 2002, the National Academy of Sciences conducted a review of the NNI and spoke favorably of the quality of the research and the opportunities for rapid technological innovation. However, the review also raised several concerns and made a number of recommendations, including: (1) establish an independent advisory board, (2) develop a strategic plan, (3) effect greater interagency coordination, (4) promote interdisciplinary nanotechnology R&D, and (5) address potential societal and ethical concerns.

The *21st Century Nanotechnology Research and Development Act* (P.L. 108–153) addresses these issues with the program as raised by the National Academy of Sciences and other outside experts. It requires the President to implement a National Nanotechnology Program to invest in federal research and development (R&D) programs in nanotechnology and provide for interagency coordination of federal nanotechnology activities. The legislation provides that among other activities, the program shall: (1) provide grants to investigators; (2) establish interdisciplinary nanotechnology research centers; (3) accelerate the deployment and application of nanotechnology research and development in the private sector; and (4) take specified steps to ensure that ethical, legal, environmental, and other appropriate societal concerns are considered during the development of nanotechnology. The National Science and Technology Council (NSTC) will oversee the planning, management, and coordination of the program.

The legislation also requires the President to establish a National Nanotechnology Coordination Office to provide technical and administrative support to the program, serve as the point of contact on federal nanotechnology activities, conduct public outreach, and promote access to and early application of the technologies, innovations, and expertise derived from program activities.

The National Research Council is required to triennially evaluate the program, and as part of the first triennial evaluation, to conduct studies to (1) determine the technical feasibility of molecular self-assembly for the manufacture of materials and devices at the molecular scale; and (2) assess the need for standards, guidelines, or strategies for ensuring the responsible development of nanotechnology.

In addition, by authorizing a federal nanotechnology research and development (R&D) program in statute, the act assures stable, long-term support for these efforts.

Legislative History

On February 13, 2003, Committee on Science Chairman Sherwood Boehlert introduced H.R. 766. It was referred solely to the Committee on Science. The Committee held hearings on the measure on March 19, 2003 and April 9, 2003 and reported the meas-

ure, as amended, by a voice vote on May 1, 2003. Several amendments were adopted at the markup, including amendments to:

- Make technical changes, increase authorization levels, and give the President greater flexibility to designate an advisory committee.
- Require interdisciplinary research centers to exchange technical information and best practices; to partner with states and industry; to make use of existing expertise in their regions and of ongoing micrometer-scale R&D; and to accelerate commercialization of nanotechnology.
- Require that the annual report include budget information on spending for research programs on societal and ethical concerns.
- Require that the Interagency Committee develop a plan for using Federal programs, such as the Small Business Innovation Research (SBIR) Program and the Small Business Technology Transfer Research (SBTTR) Program, in support of commercialization of nanotechnology and that the annual report include an assessment of the implementation of the plan and a report on the amount of SBIR and SBTTR funds supporting the plan.

The House passed H.R. 766, as amended, on May 7, 2003 by: Y–405; N–19; Roll Call No. 167. On May 8, 2003, H.R. 766 was received in the Senate and referred to the Committee on Commerce, Science, and Transportation. It was then informally conferenced with the Senate companion bill, S. 189, which passed the Senate by unanimous consent on November 18, 2003, and passed the House by voice vote on November 20, 2003. The bill was signed by the President on December 3, 2003 and became Public Law 108–153.

1.4—P.L. 108–169, United States Fire Administration Reauthorization Act of 2003 (S. 1152/H.R. 2692)

Background and Summary of Legislation

In the early 1970's, a report by the President's National Commission on Fire Prevention and Control entitled *America Burning* presented a dismal assessment of fire safety in the United States. In response to the report, Congress created the United States Fire Administration (USFA) and the National Fire Academy. USFA is housed within the Federal Emergency Management Agency (FEMA) and is charged with helping to prevent and control fire-related losses. It was established in 1974, and by 1998, had helped reduce civilian fire deaths from over 12,000 per year to under 4,000. Additionally, using nearly any measure—number of fires, deaths, injuries, or property losses—the statistics are on an improving trend.

Despite this significant progress, the United States still has one of the worst fire safety records in the industrialized world. The per capita death rate remains two to three times that of several European nations and at least 20 percent higher than most developed countries. Fire remains the cause of approximately 3,700 deaths and $11 billion in economic damages each year, and every 18 sec-

onds a fire department responds to a call somewhere in the United States.

USFA's mission is to provide leadership, coordination, and support for the Nation's fire prevention and control, fire training and education, and emergency medical services activities, particularly for America's 26,350 fire departments. USFA programs include the Assistance to Firefighters Grant Program and programs for data collection, public education and awareness, training, and research.

Title I of P.L. 108–169 re-establishes the position of USFA Administrator and reauthorizes USFA from FY 2004 through FY 2008.

Title II addresses firefighting research and coordination. It allows the Administrator to provide assistance in fire prevention and control technologies and directs the Administrator to: (1) develop new, and utilize existing, measurement techniques and testing methodologies for evaluating firefighting technologies; (2) evaluate the compatibility of new and existing equipment and technology; and (3) support the development of new standards through national voluntary consensus standards organizations for new firefighting technologies.

The measure directs the Administrator to require that new equipment or systems purchased through the Assistance to Firefighters Grant Program meet or exceed established applicable voluntary consensus standards though the Administrator can waive this requirement under specified conditions. However, a grant applicant who proposes to purchase new equipment or systems that do not meet or exceed applicable voluntary consensus standards must include in the application an explanation of why such equipment or systems will serve the needs of the applicant better than equipment or systems that do meet or exceed such standards. The grant applicant can also include a second grant request in the application in the event the primary grant request is not approved on the grounds of the equipment not meeting such standards.

The Administrator is also required to: (1) provide technical assistance and training to State and local fire service officials to establish nationwide and State mutual aid systems for dealing with national emergencies; (2) develop and make model mutual aid plans for both intrastate and interstate assistance available to State and local fire service officials; and (3) report to Congress on the need for a strategy concerning deployment of volunteers and emergency response personnel, including a national credentialing system, in the event of a national emergency. The Department of Homeland Security must report to Congress on plans for revisions to the Federal Response Plan and its integration into the National Response Plan, including how the revised plan will address response to terrorist attacks, particularly in urban areas, including fire detection and suppression and related emergency services.

The measure authorizes the Superintendent of the National Academy for Fire Prevention and Control to train fire service personnel in: (1) strategies for building collapse rescue; (2) the use of technology in response to fires; (3) response, tactics, and strategies for dealing with terrorist-caused national catastrophes; (4) use of and familiarity with the Federal Response Plan; (5) leadership and strategic skills, including integrated management systems oper-

ations and integrated response; (6) strategies and tactics for fighting forest fires; (7) integration of terrorism response agencies into the national terrorism incident response system; and (8) response tactics and strategies for fighting fires at U.S. ports, including fires on the water and aboard vessels. It also requires the Superintendent to offer at the Academy and at other sites courses and training assistance as necessary to accommodate all geographic regions and needs of career and volunteer firefighters.

Legislative History

On July 10, 2003, Subcommittee on Research Chairman Nick Smith and Subcommittee on Research Ranking Minority Member Eddie Bernice Johnson introduced H.R. 2692. It was solely referred to the Committee on Science. On July 11, 2003, the measure was referred to the Subcommittee on Research. The Subcommittee held a hearing on July 17, 2003 and ordered the measure reported, as amended, by a voice vote that same day. The Full Committee ordered the measure reported, as amended, by a voice vote on July 22, 2003.

The Senate companion bill, S. 1152, *United States Fire Administration Reauthorization Act,* was introduced by Senator John McCain on May 25, 2003. An informal pre-conference on the reported versions of the two bills was held, and the full Senate passed the measure, as amended, by unanimous consent on November 20, 2003. The bill was then approved by the House by a voice vote the next day. It was signed by the President on December 6, 2003 and became Public Law 108–169.

1.5—P.L. 108–176, VISION 100—CENTURY OF AVIATION REAUTHORIZATION ACT (H.R. 2115)

[Legislative note: A modified version of H.R. 2734, Federal Aviation Administration Research and Development Reauthorization Act, *was incorporated into P.L. 108–176.)*

Background and Summary of Legislation

Many of the provisions in Title VII of H.R. 2115, the *Vision 100 Century of Aviation Reauthorization Act* were based on provisions included in H.R. 2734, legislation introduced in the House by Rep. Forbes (VA–04). This bill was reported to the House by the Science Committee on July 22, 2003. A description of Title VII of the bill follows.

Title VII—Aviation Research

Section 701 authorizes spending for Federal Aviation Administration Research and Development programs in the following amounts—$346.3 million for FY 2004; $356.2 million for FY 2005; $352.2 million for FY 2006; and $356.3 million for FY 2007.

Section 702 directs the FAA Administrator to establish a scholarship for service program designed to recruit and prepare students for careers in aviation. Scholarships will be awarded competitively, with recipients agreeing to serve as full-time employees of FAA, working two years for each year of scholarship awarded. This Sec-

tion specifies student eligibility criteria, and exceptions to service. The Administrator is authorized to spend up to $10 million annually for this program.

Section 703 directs the Administrator of the National Aeronautics and Space Administration to establish a scholarship for service program designed to recruit and prepare students for careers in aviation. Scholarships will be awarded competitively, with recipients agreeing to serve as full-time employees of NASA, working two years for each year of scholarship awarded. This Section specifies student eligibility criteria, and exceptions to service. The Administrator is authorized to spend up to $10 million annually for this program.

Section 704 directs the FAA Administrator to continue a program awarding grants to nonprofit concrete and asphalt pavement research foundations to improve the design, construction, rehabilitation and repair of airfield pavements.

Section 705 directs the FAA Administrator to review airfield pavement standards to ensure that they meet the agency's 20-year pavement life requirement.

Section 706 requires the FAA to conduct research promoting development of analytical tools to improve existing aircraft certification methods, and to reduce the cost for certification of new products.

Section 707 adds, as an eligible activity, research on the impact of new technologies and procedures for training pilots and air traffic controllers.

Section 708 establishes a Center for Excellence for applied research and training in the use of advanced materials in aircraft.

Section 709 directs the Secretary of Transportation to establish a Joint Planning and Development Office (JPDO) within the Federal Aviation Administration to manage work related to the development of a next generation air transportation system capable of safely and efficiently handling forecasted air traffic in the year 2025. The JPDO shall oversee and coordinate research and development between FAA, NASA, the Department of Homeland Security, the Department of Defense, the Department of Commerce, and other relevant federal agencies. It will also ensure that private industry, user groups, labor, general aviation, and space access companies will be consulted. The JPDO is directed to produce a national strategic plan to Congress, followed by annual updates and changes, if any, to the strategic plan. $50 million is authorized for each of the years FY 2004 through FY 2010.

Section 710 directs the Secretary of Transportation to establish a Senior Policy Committee to provide guidance and oversight of the work of the Joint Planning and Development Office. Members shall be the Secretary (or the designee) of the Department of Transportation; the Department of Defense; the Department of Homeland Security; and the Department of Commerce; and the Director of the Office of Science and Technology Policy.

Section 711 directs the FAA Administrator to establish a rotorcraft research and development initiative, with the objective of developing and demonstrating in a relevant environment, within 10 years, technologies enabling rotorcraft to operate more quietly, safely, and efficiently.

Section 712 directs the Secretary of Transportation to establish a four-year pilot airport cooperative research program that identifies problems shared by airport operating agencies that can be solved through applied research. $10 million is authorized for each of the four years. No later than 6 months after the expiration of the program, the Secretary shall transmit to Congress a report on the program, including recommendations on whether it should be made permanent.

Legislative History

H.R. 2734, the *Federal Aviation Administration Research and Development Reauthorization Act,* was introduced by Representative J. Randy Forbes on July 15, 2003 and referred to the Committee on Science. On July 22, 2003 the Committee considered the measure and ordered it reported, as amended, by a voice vote. The Committee filed H.Rept. 108–405, Part I on December 8, 2003. Provisions of H.R. 2734, *Federal Aviation Administration Research and Development Reauthorization Act,* were incorporated into H.R. 2115, *Vision 100—Century of Aviation Reauthorization Act.*

On July 15, 2003, the Speaker appointed Chairman Boehlert, Mr. Rohrabacher, and Mr. Costello as additional conferees to H.R. 2115, *Vision 100—Century of Aviation Reauthorization Act,* for consideration of Section 102 of the House bill, and Sections 102, 104, 621, 622, 641, 642, 661, 662, 663, 667, and 669 of the Senate amendment. These conference committee deliberations resulted in inclusion of provisions of H.R. 2734, the *Federal Aviation Administration Research and Development Reauthorization Act,* into H.R. 2115. On October 29, 2003, the Committee of Conference filed H.Rept. 108–334 on H.R. 2115. The House agreed to the conference report by: Y–211; N–207; Roll Call No. 592—clearing the measure for the Senate on October 30, 2003. The Senate agreed to the conference report on November 21, 2003 by a voice vote—clearing the measure for the President. On December 12, 2003, the President signed H.R. 2115, *Vision 100—Century of Aviation Reauthorization Act,* which became Public Law 108–176.

1.6—P.L. 108–201, NASA WORKFORCE FLEXIBILITY ACT OF 2004 (S. 610/H.R. 1085)

Background and Summary of Legislation

In May 2002, NASA proposed to the Committee a list of changes to civil service law designed to improve NASA's ability to recruit and retain highly skilled scientists, engineers, and program managers. The agency proposed additional changes in February 2003. NASA found it needed additional recruitment and retention tools because of the declines in university enrollment for U.S. students in technical fields, increased hiring competition from industry and academia for technical skills, and a lack of minority and gender diversity in the scientists and engineers (S&E) talent pool. NASA also identified several workforce trends within the agency that posed a significant threat to its ability to support its technical programs and address the agency's management challenges. From fiscal year 1993 to 2000, NASA reduced its civil service workforce by 26 percent. Within NASA's S&E workforce, the over-60 population

outnumbers its under-30 population by nearly three to one. At some NASA centers, the ratio is more than five to one. By contrast, in 1993, the under-30 S&E workforce outnumbered the over-60 group by almost two to one. Approximately 15 percent of NASA's S&E employees are currently eligible to retire, and within five years, almost 25 percent of NASA's S&E workforce will be retirement eligible.

The *NASA Workforce Flexibility Act of 2004* makes the following policy changes:

- Provides the Administrator of NASA the authority to compensate certain excepted personnel at the basic rate payable for level III of the Executive Schedule.
- Amends federal employee provisions to establish separate workforce authorities and personnel provisions for NASA.
- Requires the NASA Administrator, before exercising any such authorities, to submit to Congressional committees a written workforce plan and to obtain plan approval from the Office of Personnel Management (OPM).
- Includes among NASA workforce authorities the authority to: (1) pay recruitment, redesignation, relocation, and retention bonuses in exchange for service agreements; (2) make term appointments of one to six years and permanent conversions; (3) fix basic rates of pay for critical positions; and (4) extend intergovernmental personnel act assignments to up to four years.
- Directs the Administrator to establish a National Aeronautics and Space Administration Science and Technology Scholarship Program to award scholarships to individuals in return for contractual agreements under which such individuals agree to serve as full-time NASA employees for two years for each year of such scholarships.
- Authorizes the Administrator to appoint directly to the General Schedule of Compensation for Federal Employees in GS–7 through GS–12 positions individuals in professional and research fields who meet specified educational requirements.
- Authorizes the Administrator to pay the travel, transportation, and relocation expenses of certain new appointees to the same extent and in the same manner as the payment of such expenses for transferred employees.
- Authorizes the Administrator, with the approval of OPM, to set the pay of an employee paid under the General Schedule at any step within the pay range for the grade of the position if such employee possesses unusually high or unique qualifications and is assigned new duties, without a change in position, or to a new position.

Legislative History

The *NASA Workforce Flexibility Act of 2004* was principally drafted in the Committee on Science with support from the Committee on Government Reform. Chairman Boehlert introduced H.R. 1085 on March 5, 2003, with Mr. Bishop, Mr. Burgess, Mr. Rohr-

abacher, Mr. Schrock, Mr. Baker, Mr. Cramer, Mr. Wicker, and Ms. Eshoo as original co-sponsors and jointly referred to the Committee on Science and the Committee on Government Reform.

The bill was referred to the Subcommittee on Space and Aeronautics on March 12, 2003. A hearing was held by the Full Committee on March 12, 2003. The Subcommittee on Space and Aeronautics held a markup on June 26, 2003, and ordered the measure reported, as amended, to the Full Committee by a voice vote. On July 22, 2003, the Committee considered H.R. 1085 and ordered the measure reported, as amended, by a Roll Call Vote: Y–21; N–14. The Committee filed H.Rept. 108–244, Part 1 on August 4, 2003. Provisions of H.R. 1085, *NASA Flexibility Act of 2003,* were incorporated into S. 610, *NASA Flexibility Act of 2004,* Senate companion measure.

On March 13, 2003, Senator Voinovich introduced S. 610, NASA Flexibility Act of 2004, along with Mr. Nelson of Florida, Mr. Lott, Mr. Cochran, Mr. Stevens, Mr. Sessions, Mr. Shelby, Mr. Allen, Mr. Coleman, and Mr. Carper as co-sponsors. On June 17, 2003 the Senate Committee on Governmental Affairs held a markup and ordered the measure reported, with an amendment in the nature of a substitute, by voice vote. The Committee filed S.Rept 108–113 on July 28, 2003. The Senate passed S. 610, as amended, by a voice vote on November 24, 2003. The measure was received in the House and held at the desk on November 25, 2003.

On January 28, 2004, the House passed S. 610, without amendment, by a voice vote-clearing the measure for the President. On February 3, 2004, the House agreed to H.Con.Res. 354, NASA Workforce Flexibility Act Technical Corrections Act by a voice vote. This measure permitted the correction of technical errors in the enrollment of S. 610, NASA Flexibility Act of 2003. On February 10, 2004, the Senate agreed to H.Con.Res. 354, by a voice vote—clearing the enrollment of S. 610 for the President. On February 24, 2004, the President signed S. 610, NASA Flexibility Act of 2004, which became Public Law 108–201.

1.7—P.L. 108–219, CONVEYANCE OF NOAA VESSEL TO UTROK ATOLL (H.R. 2584)

Background and Summary of Legislation

The National Oceanic and Atmospheric Administration (NOAA) oceanographic research vessel that will transfer under this legislation is the *McArthur,* which was decommissioned on May 20, 2003. This ship is 175 feet in length, has a draft of 12 feet, a displacement of more than 1,000 tons, a cruising range of 6,600 nautical miles, and cruising speed of ten knots. It was constructed by the Norfolk Shipbuilding and Drydock Company in Virginia. This vessel was commissioned in December of 1966 and was used by NOAA for more than 35 years to conduct chemical, meteorological, and biological sampling for several large scale programs. The majority of the *McArthur*'s work was performed in several National Marine Sanctuaries on the West Coast of the United States.

The Utrok Atoll is one of the 29 low coral atolls that comprise the Republic of the Marshall Islands. It has a current population of about 600 people, and the atoll is slightly smaller than one

square mile. During the period of nuclear bomb testing, the residents of the Utrok Atoll were exposed to the effects of radiation caused by a miscalculation of the effects of the March 1954 Bravo Hydrogen bomb test on Bikini Island. Regrettably the fallout from this test drifted to several neighboring islands including Utrok, which is approximately 255 miles from the bomb site. Since that time, Utrok residents have suffered increased rates of thyroid cancer and birth defects.

This vessel will provide an essential means of transportation to those living on the atoll and the 3,000 residents living throughout the Marshall Islands to the Department of Energy's Whole Body Counting Facility in the city of Majuro. This city is the capital of the Marshall Islands and it is more than 250 miles from the Utrok Atoll. This facility was dedicated on July 19, 2003, and it is designed to monitor radioactivity in the people of Utrok. It is currently difficult to provide access to these medical facilities because of not only its location but the cost and infrequency of airline transportation. In addition, the transferred vessel will be used for any resettlement of residents, to transport tons of potassium fertilizer and equipment required for radiation cleanup and environmental monitoring and to periodically ship U.S. Department of Agriculture food to Utrok. This food is necessary to supplement the diet of the residents of Utrok because the food grown on the island is contaminated with radioactive Cesium-137.

H.R. 2584 stipulates that the Secretary of Commerce may convey to the Utrok Atoll government all rights, title and interests to a decommissioned NOAA vessel. In addition, the legislation requires that the vessel be in operable condition at the time of transfer and that any responsibility or liability for maintaining the vessel in the future is conveyed to the Utrok government.

Legislative History

H.R. 2584 was introduced on June 24, 2003, by Congressman Eni Faleomavaega (D–AS). The legislation was referred to the Committee on Resources and within the Committee to the Subcommittee on Fisheries Conservation, Wildlife, and Oceans. On October 29, 2003, the Full Resources Committee met to consider the bill. The Committee on Resources filed H.Rept. 108–378 on November 18, 2003. In that report is an exchange of letters between the Committee on Science and the Committee on Resources acknowledging that the Committee on Science has jurisdiction over the legislation.

On November 21, 2003 the measure passed that House by a voice vote. It was then received in the Senate and referred to the Senate Committee on Commerce, Science, and Transportation.

On March 24, 2004, the Senate Committee on Commerce, Science, and Transportation discharged the measure. The measure passed the Senate the same day, as amended, by unanimous consent. It was then received by the House and held at the desk.

The House agreed to the Senate amendments and the measure passed the House on March 29, 2004. H.R. 2584 was signed by the President on April 13, 2004 and became P.L. 108–219.

1.8—P.L. 108–320, MALCOLM BALDRIGE AWARDS FOR NONPROFIT ORGANIZATIONS (H.R. 3389)

Background and Summary of Legislation

The Malcolm Baldrige National Quality Awards were established in 1987 to promote improved quality assurance and management in U.S. companies and organizations. The Awards recognize those that have substantially benefited the economic or social well-being of the United States through outstanding improvements in the quality of their goods and services that result from the effective practice of quality management. The Awards were intended to raise awareness about the importance of quality and performance to competitiveness, and establish a process to disseminate information about successful strategies and best practices.

The mechanism for making these awards, established in the law, is a public-private partnership housed in the National Institute of Standards and Technology (NIST). Authority was provided in the underlying statute to seek and accept gifts from public and private sources to carry out the program. Today, NIST is responsible for the development of the criteria under which each award is made, the training of the examiners who will review applicants to the awards program, and the publication of criteria and related information for dissemination to the public. Collectively these activities are known as the Baldrige National Quality Program. The American Society for Quality (ASQ) assists in the administration of the award program under a contract with NIST. The Foundation for the Malcolm Baldrige Quality Award was created to raise funds to permanently endow the partnership. Prominent leaders from U.S. organizations serve as Foundation Trustees.

The awards are made on the basis of the Baldrige Criteria, which are based on seven general categories: leadership; strategic planning; customer and market focus; measurement, analysis, and knowledge management; human resource focus; process management; and business results. The Criteria constitute a methodology companies and other organizations can apply themselves to improve quality and productivity.

Companies or organizations that compete for the Malcolm Baldrige National Quality Award participate in an application and examination process in which the NIST trained examiners audit the organization or company and score them according to the Baldrige Criteria. Each applicant receives a feedback report at the end of review process which provides an analysis of the applicants' strengths and recommendations for improvement. Award winners are required to share information on their practices and strategies with other U.S. organizations, which they do through the annual Quest for Excellence conference, and a variety of other public sessions.

Since the passage of the law, the Baldrige Criteria have become commonly used by companies worldwide to increase their performance. In addition, a large number of the U.S. States have established their own state-level Baldrige Award systems to recognize excellence, and have begun to establish categories in addition to those offered at the national level. One of these categories is the nonprofit category. A nonprofit category permits entities from the

nonprofit sector not involved in health care or education, or entities of Federal, State, or local government not similarly employed, to compete on the basis of the Baldrige Criteria. This category has proven especially popular and nonprofits and States where this category is recognized have urged Congress to establish a nonprofit category within the Malcolm Baldrige National Quality Award.

Legislative History

On October 29, 2003 Congressman Brad Miller introduced H.R. 3389, to amend the *Stevenson-Wydler Technology Innovation Act of 1980* to permit Malcolm Baldrige National Quality Awards to be made to nonprofit organizations, and the bill was referred to the Committee on Science. On February 2, 2004, the bill was discharged from the Subcommittee on Environment, Technology, and Standards.

On February 4, 2004, the Committee on Science considered H.R. 3389. No amendments were offered and the Committee favorably reported the bill by voice vote and filed H.Rept. 108–419.

On March 3, 2004, H.R. 3389 was considered by the House and passed without amendment. H.R. 3389 was then received by the Senate the following day and was referred to the Committee on Commerce, Science, and Transportation. The Committee discharged the measure on September 23, 2004, and it passed the Senate the same day. H.R. 3389 was signed by the President on October 5, 2004 and became P.L. 108–320.

1.9—P.L. 108–360, National Earthquake Hazards Reduction Program Reauthorization Act of 2004 (H.R. 2608)

Background and Summary of Legislation

P.L. 108–360 includes H.R. 2608, the *National Earthquake Hazards Reduction Program Reauthorization Act of 2004* (Title I), H.R. 3980, the *National Windstorm Impact Reduction Act of 2004* (Title II), and the authorization levels in H.R. 3752, the *Commercial Space Launch Amendments Act of 2004* (Title III).

Title I, National Earthquake Hazards Reduction Program

A culmination of efforts, largely in response to the great Alaskan earthquake of 1964 and San Fernando earthquake of 1971, led to the creation of the National Earthquake Hazards Reduction Program (NEHRP) by the *Earthquake Hazards Reduction Act of 1977* (P.L. 95–124). NEHRP is a long-term, comprehensive, multi-agency earthquake hazards mitigation program designed to minimize the loss of life and property from earthquakes. The participating agencies are the Federal Emergency Management Agency (FEMA), U.S. Geological Survey (USGS), National Science Foundation (NSF), and National Institute of Standards and Technology (NIST).

Since its inception, NEHRP has contributed significantly to reducing vulnerability to earthquakes. Perhaps most notable is the vast improvement in the ability to design a built environment that can resist significant earthquake shaking with little or no damage. NEHRP research and mitigation has also produced valuable tools for mitigating earthquake hazards, including new national hazard maps, improved seismic design provisions for new buildings, guide-

lines for the rehabilitation of existing buildings, loss estimation methodologies, performance-based design methodologies, and real-time shake maps for first responders and other public officials.

Reauthorization of NEHRP is contained in Title I of P.L. 108–360. The measure requires that program activities be designed to: (1) develop effective measures for earthquake hazards reduction; (2) promote the adoption of such measures by Federal, State, and local governments, national standards and model code organizations, architects and engineers, building owners, and others with a role in planning and constructing buildings, structures, and lifelines; and (3) improve the understanding of earthquakes and their effects on communities, buildings, structures, and lifelines through interdisciplinary research. Further, it establishes an Interagency Coordinating Committee on Earthquake Hazards Reduction, to be chaired by the NIST Director and requires the NIST Director to establish an Advisory Committee on Earthquake Hazards Reduction. It also moves the responsibility for planning and coordinating the program from FEMA to NIST.

The measure authorizes appropriations for carrying out the Act for: (1) FEMA for FY 2004 through 2006, including for supporting the development of performance-based, cost-effective, and affordable codes for buildings, structures, and lifelines; (2) USGS for FY 2004 through 2008, including funds for the completion of the Advanced National Seismic Research and Monitoring System; (3) NSF for FY 2004 through 2006, including for the George E. Brown, Jr. Network for Earthquake Engineering Simulation; and (4) NIST for FY 2004 through 2006, including for supporting the development of the codes specified above.

Title II, the National Windstorm Impact Reduction Program

The United States currently sustains several billion dollars each year in property and economic losses due to windstorms. While estimates of annualized windstorm damages are variable and limited in scope, the National Weather Service estimates that between 1995 and 2002, hurricanes, tornadoes, and thunderstorm winds caused on average $4.5 billion in damage per year. Similarly, the American Society of Civil Engineers has estimated windstorm damages to be in excess of $5 billion per year. A variety of cost-effective windstorm hazard mitigation measures exist, and many more are undergoing research and development. It is unclear to what extent these mitigation technologies have been adopted, but it is generally agreed that they have been under-utilized, and that significant improvements in the wind resistance of buildings and other structures will not be achieved without improved incentives at the local and individual level. This fact, combined with growing populations in coastal areas particularly susceptible to major windstorms, has led to substantial increases in the overall windstorm vulnerabilities. Evaluations of the size, scope, and effectiveness of current mitigation efforts have found significant room for improvement.

Provisions contained in Title II of P.L. 108–360 refer to the establishment of a National Windstorm Impact Reduction Program, the objective of which is to achieve major measurable reductions in losses of life and property from windstorms. The program is to con-

sist of the following primary mitigation components: (1) improved understanding of windstorms; (2) windstorm impact assessment; and (3) windstorm impact reduction, which shall be implemented through activities such as data collection and analysis and research and development. Research activities authorized under this Act are to be peer-reviewed and the components to be designed to be complementary to, and avoid duplication of, other hazard reduction efforts.

The legislation requires the Director of the Office of Science and Technology Policy (OSTP) to establish an Interagency Working Group consisting of representatives of NSF, the National Oceanic and Atmospheric Administration (NOAA), NIST, FEMA, and other federal agencies as appropriate. The working group is to develop an implementation plan for achieving program objectives and transmit biennial reports on the status of the program. The OSTP Director is also required to establish a National Advisory Committee on Windstorm Impact Reduction.

The measure authorizes appropriations for FY 2006–2008 for FEMA, NSF, NIST, and NOAA.

Title III, Commercial Space Transportation

Title III of H.R. 2608 authorizes appropriations to the Department of Transportation for the activities of the Office of Commercial Space Transportation for fiscal years 2005 through 2009. These levels were incorporated from H.R. 3752, the *Commercial Space Launch Amendments Act of 2004,* a modified version of which (H.R. 5382) became Public Law 108–492 on December 23, 2004. For further information, see the legislative summary for P.L. 108–492.

Legislative History

H.R. 2608

On June 26, 2003, Subcommittee on Research Chairman Nick Smith, Representative Brian Baird, and Representative Zoe Lofgren introduced H.R. 2608. The measure was referred to the Committee on Science and Committee on Resources. The Committee on Science ordered the measure reported, as amended, by a voice vote on July 22, 2003, and on August 14, 2003, the Committee on Resources discharged the measure. The House passed the measure under suspension, as amended, by a voice vote on October 1, 2003.

On October 2, 2003, H.R. 2608 was received in the Senate and referred to the Committee on Commerce, Science, and Transportation. The Subcommittee on Science, Technology, and Space held a hearing on June 24, 2004, and on July 22, 2004, the Full Committee ordered the measure reported, without amendment, favorably.

H.R. 3980

On March 17, 2004, Representative Randy Neugebauer introduced H.R. 3980 and it was referred to the Committee on Science and the Committee on Transportation and Infrastructure. On March 19, 2004, the measure was referred to the Subcommittee on Environment, Technology, and Standards and the Subcommittee on

Research of the Science Committee and a joint subcommittee hearing was held on March 24, 2004. The Full Science Committee held a markup of the measure on March 31, 2004 and ordered the measure reported, as amended, by a voice vote.

On June 28, 2004, the Committee on Armed Services and Committee on Transportation and Infrastructure discharged the measure and on July 8, 2004 the House passed H.R. 3980, as amended, by: Y–387; N–26; Roll Call No. 338. On July 12, 2004, the measure was received in the Senate and referred to the Committee on Commerce, Science, and Transportation.

Combined legislation

An informal pre-conference led to the incorporation of H.R. 3980, as amended, and the authorization levels from H.R. 3752 into H.R. 2608, expansion of the NEHRP authorization through FY 2009, and other minor changes. The Senate passed H.R. 2608, as amended, by a voice vote on October 6, 2004. On October 8, 2004, the House agreed to the Senate amendment by a voice vote. The measure was signed by the President on October 25, 2004 and became Public Law 108–360.

1.10—P.L. 108–375, Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (H.R. 4200)

[Legislative note: H.R. 4107, Assistance to Firefighters Grant Reauthorization Act of 2004, *was incorporated into the House/Senate conference report on H.R. 4200. Also, modified language from H.R. 3966,* ROTC and Military Recruiter Equal Access to Campus Act of 2004, *was included in P.L. 108–375.]*

Background and Summary of Legislation

On August 28, 2004, the Speaker appointed Science Committee Chairman Sherwood Boehlert, Subcommittee on Research Chairman Nick Smith, and Science Committee Ranking Minority Member Bart Gordon as additional conferees to H.R. 4200, the *National Defense Authorization Act for Fiscal Year 2005,* for consideration of Section 596 of the House bill and Sections 1034, 1092, and Title XXXV of the Senate-passed version (S. 2400).

These conference committee deliberations, contained in H.Rept. 108–767 (conference report to accompany H.R. 4200), resulted in the enactment of Sections 1034 (renamed as Section 914), 1092, and Title XXXV (renamed as Title XXXVI). Section 596 of the original House-passed bill and Section 1034 of the Senate version was not included in the final legislation, which was signed by the President on October 28, 2004. Descriptions of the aforementioned provisions follow.

Title XXXV—Assistance to Firefighters

The Senate version of the legislation, passed on June 23, 2004, contained a Title reauthorizing the Assistance to Firefighters Grant Program within the Department of Homeland Security. The amendment was a modified version of S. 2411, which is companion

legislation to H.R. 4107, introduced by Chairman Boehlert on April 1, 2004.

The Assistance to Firefighters Grant Program, commonly known as the FIRE Act, makes competitive awards to fire departments nationwide for the purchase of equipment, vehicles, and training. The program's main function is to improve the baseline readiness for day-to-day firefighting activities performed by fire departments. Since its inception, the FIRE Act program has distributed more than $1 billion to nearly 17,000 paid and volunteer fire departments nationwide. More than 20,000 departments have applied for the $750 million available under the program for FY 2004.

The authorization language, as amended in its final form, amends the *Federal Fire Prevention and Control Act of 1974,* reauthorizing $4.8 billion for the FIRE Act through FY 2009 ($900 million in FY 2005, $950 million in FY 2006, and $1 billion each year thereafter). While the bill leaves the FIRE Act mostly unchanged, it does make several programmatic changes, including: transferring the program from the Department of Homeland Security's Office of Domestic Preparedness back to the U.S. Fire Administration; expanding eligibility requirements to include non-profit, non-hospital Emergency Medical Service squads; increasing the grant-size cap; and reducing federal matching requirements for jurisdictions serving more than 50,000 people.

Section 1034—Nondisclosure of Certain Products of Commercial Satellite Operations

The Senate version of the legislation included a section making federal disclosure requirements under the *Freedom of Information Act* inapplicable with respect to land remote sensing information collected by the United States, including any such information provided to a State, local, or tribal government. Additionally, it requires the head of each agency having or supplying such information to take all necessary steps to protect such information from public disclosure.

Section 1092—Clarification of Fiscal Year 2004 Funding Level for a National Institute of Standards and Technology Account

The Senate version of the legislation contained a section clarifying and supporting the reprogramming of FY 2004 funding for the National Institute of Standards and Technology. Specifically, the section clarifies that the Secretary of Commerce shall make all determinations based on the Industrial and Technology Services funding level of $218,782,000 for reprogramming and transferring of funds for the Manufacturing Extension Partnership.

Section 596—Senior Reserve Officer Training Corps and Recruiter Access at Institutions of Higher Education

The original House-passed version of H.R. 4200 contained a section expanding the list of covered federal funds that would be denied to an institution of higher education if the Secretary of Defense determines that the college or university prohibits or prevents military recruiters from accessing the institution for Reserve Officers Training Corps (ROTC) recruitment. The expanded list includes the Department of Homeland Security, Department of En-

ergy National Nuclear Security Administration, Central Intelligence Agency, and the Department of Transportation. It also requires the Secretary of Defense to request information from colleges and universities verifying their support of ROTC programs in the upcoming academic year. The language was struck during conference negotiations and was not included in the final version of H.R. 4200.

1.11—P.L. 108–391, EXPRESSING THE SENSE OF THE CONGRESS IN RECOGNITION OF THE CONTRIBUTIONS OF THE SEVEN *Columbia* astronauts by supporting establishment of a Columbia Memorial Space Science Learning Center (H.J.Res. 57)

Background and Summary of Legislation

H.J.Res. 57, sponsored by Ms. Roybal-Allard and co-sponsored by 53 other Members from both sides of the aisle, expresses the sense of Congress that: (1) the space science learning center in Downey, California, should be designated as the Columbia Memorial Space Science Learning Center; and (2) the Government, along with public and private organizations and persons, should continue to cooperate in the establishment of such center.

Legislative History

H.J.Res. 57 was introduced on May 22, 2003 and solely referred to the Committee on Science. On October 5, 2004, the Committee discharged the bill, and the House agreed to suspend the rules and pass H.J.Res. 57, as amended, by voice vote. On October 6, 2004 it was received in the Senate and held at the desk. The Senate passed H.J.Res. 57 by unanimous consent, on October 10, 2004—clearing the measure for the President. On October 30, 2004, the President signed H.J.Res. 57, Expressing the sense of the Congress in recognition of the contributions of the seven *Columbia* astronauts by supporting establishment of a Columbia Memorial Space Science Learning Center, which became Public Law 108–391.

1.12—P.L. 108–423, DEPARTMENT OF ENERGY HIGH-END COMPUTING REVITALIZATION ACT OF 2004 (H.R. 4516)

Background and Summary of Legislation

High-performance computing—also called supercomputing, high-end computing, and sometimes advanced scientific computing—refers to the use of machines or groups of machines that can perform very complex computations very quickly. High-performance computers are, by definition, the most powerful computers in the world at a given moment in time. They are used to solve highly complex scientific and engineering problems, to simulate physical systems that are often difficult to study experimentally, or to manage vast amounts of data.

The Federal Government promotes high-performance computing in several different ways. First, it funds research and development (R&D) at universities, government laboratories and companies to help develop new computer hardware and software; second, it funds the purchase of high-performance computers for universities and government laboratories; and third, it provides access to high-

performance computers for a wide variety of researchers by allowing them to use government-supported computers at universities and government labs. In recent years, federally-supported efforts appear to have lost momentum as the focus of computing activities began shifting from high-performance computing to less specialized computing and networking technologies.

The purpose of P.L. 108–423 is to authorize a program at the Department of Energy (DOE) to support research and development to advance high-end computing systems and to develop and deploy such systems for advanced scientific and engineering applications. The measure authorizes appropriations for the program for FY 2005–2007. P.L. 108–423 directs the Secretary of Energy, acting through the Director of the Office of Science, to implement a research and development program (involving software and hardware development) to advance high-end computing systems and to develop and deploy them for advanced scientific and engineering applications. The program is to include research into (1) multiple architectures, which may include vector, reconfigurable logic, streaming, processor-in-memory, and multithreading architectures; and (2) software development on optimal algorithms, programming environments, tools, languages, and operating systems for high-end computing systems, in collaboration with architecture development efforts.

The Secretary is to establish and operate facilities to (1) conduct advanced scientific and engineering research and development using Leadership Systems, i.e. high-end computing systems that are among the most advanced in the world in terms of performance in solving scientific and engineering problems; (2) develop potential advancements in high-end computing system hardware and software; and (3) provide access to such systems on a competitive, merit-reviewed basis to researchers in U.S. industry, institutions of higher education, national laboratories, and other federal agencies. The Secretary must establish at least one High-End Software Development Center, which shall concentrate efforts to develop, test, maintain, and support optimal algorithms, programming environments, tools, languages, and operating systems for high-end computing systems. The Secretary must also use the expertise of a center to assess research and development in high-end computing system architecture.

Legislative History

On May 13, 2004 the Science Committee held a hearing on a measure that addressed federal high-performance computing research and development activities, including activities in the Department of Energy. Subsequently, H.R. 4516 was introduced by Subcommittee on Energy Chairwoman Judy Biggert and Representative Lincoln Davis on June 4, 2004, and it was solely referred to the Committee on Science. On June 7, 2004 it was referred to the Subcommittee on Energy. The Subcommittee on Energy held a markup on June 15, 2004. Chairwoman Biggert offered an en bloc amendment, which was adopted by a voice vote, and the Subcommittee ordered the measure reported, as amended, to the Full Committee by a voice vote. The Full Committee considered the measure on June 16, 2004 and ordered the bill reported, as amend-

ed, by a voice vote. The House passed H.R. 4516 under suspension, as amended, by a voice vote on July 7, 2004.

On July 8, 2004 H.R. 4516 was received in the Senate and solely referred to the Committee on Energy and Natural Resources. On September 15, 2004 the Committee on Energy and Natural Resources ordered the measure reported, favorably, with an amendment in the nature of a substitute, and on October 10, 2004 the Senate passed H.R. 4516, as amended, by unanimous consent. On November 17, 2004 the House agreed to the Senate amendment to H.R. 4516 by a voice vote. The President signed the measure on November 30, 2004 and it became P.L. 108–423.

1.13—P.L. 108–426, NORMAN Y. MINETA RESEARCH AND SPECIAL PROGRAMS REORGANIZATION ACT (H.R. 5163)

Background and Summary of Legislation

Authority for research and development at the Department of Transportation is spread across several agencies and administrations, including the Research and Special Programs Administration (RSPA). While each agency and administration controls its own specific research according to its own mission, duplication and a lack of coordination can result. The byproduct of such 'stove-pipe' research efforts are inefficiencies and poor strategic planning. The RSPA research role in the Department has been criticized for being unclear, and confused with additional responsibilities unrelated to research such as the responsibilities for the Office of Pipeline Safety.

The need to clarify the role of RSPA with respect to both research and pipeline safety, as well as the need to avoid Department-wide research duplication and inefficiency, lead to the conclusion that RSPA should be reorganized into two new administrations.

The Research and Innovative Technology Administration (RITA), created by this Act, succeeds to all the research authority currently exercised by RSPA, and includes such other duties and powers prescribed by the Secretary that advance the research goals of RITA. RITA will help the department avoid duplication of research efforts without forcing individual agencies and administrations to abandon their own unique research challenges, goals and plans. RITA will also provide strategic clarity to the Department's multi-modal and intermodal research efforts, while coordinating the multifaceted research agenda of the Department.

The Pipeline and Hazardous Materials Safety Administration (PHMSA), created by this Act, shall be responsible for the duties and powers related to pipeline or hazardous materials transportation and safety vested in the Secretary by chapters 51, 57, 61, 601, and 603 of Title 49, United States Code. PHSMA will improve the Department's oversight and regulation of pipeline safety and hazardous materials.

Legislative History

H.R. 5163 was introduced on September 29, 2004 by Chairman Young and Ranking Minority Member Oberstar and referred to

Committee on Transportation and Infrastructure, and in addition to the Committees on Energy and Commerce, and Science.

The Transportation and Infrastructure Committee's Subcommittee on Highways, Transit, and Pipelines discharged the bill on September 29, 2004. On September 29, 2004, the Transportation and Infrastructure Committee considered H.R. 5163. No amendments were offered and the Committee favorably reported the bill as amended by the Subcommittee by a voice vote. On October 6, 2004 the Science Committee discharged the bill and the Committee on Transportation filed H.Rept. 109–749.

On October 7, 2004, H.R. 5163 was considered by the House. The measure passed the House by a voice vote. H.R. 5163 was received by the Senate on October 7, 2004 and passed without amendment on November 16, 2004. H.R. 5163 was signed by the President on November 30, 2004 and became P.L. 108–426.

1.14—P.L. 108–428, TO EXTEND THE LIABILITY INDEMNIFICATION REGIME FOR THE COMMERCIAL SPACE TRANSPORTATION INDUSTRY (H.R. 5245/H.R. 3752)

Background and Summary of Legislation

H.R. 5245 extends liability insurance and financial responsibility requirements with respect to commercial space transportation through December 31, 2009. It also directs the Secretary of Transportation to arrange with a nonprofit entity for a study: (1) regarding the liability risk sharing regime in the United States for commercial space transportation; (2) to assess methods by which the liability risk sharing regime could be eliminated and whether alternative steps would be needed to maintain a viable and competitive U.S. space transportation industry if it were eliminated; and (3) to examine liability risk sharing in other nations with commercial launch capability and evaluate the direct and indirect impact that eliminating the regime would have on the competitiveness of the U.S. commercial space launch industry in relation to foreign commercial launch providers and on U.S. assured access to space.

Legislative History

On October 7, 2004, Mr. Boehlert, along with Mr. Gordon as a co-sponsor, introduced H.R. 5245, *To extend the liability indemnification regime for the commercial space transportation industry,* which was solely referred to the Committee on Science. This bill contained language previously located in H.R. 3752, the *Commercial Space Launch Amendments Act of 2004.* The Committee discharged the measure on October 8, 2004, and on the same day, the House passed the bill by voice vote—clearing the measure for the Senate. On November 16, 2004 the Senate passed the bill, without amendment—clearing the measure for the President. On November 30, 2004, the President signed H.R. 5245, *To extend the liability indemnification regime for the commercial space transportation industry,* which became Public Law 108–428.

1.15—P.L. 108–456, HARMFUL ALGAL BLOOM AND HYPOXIA AMENDMENTS ACT OF 2004 (S. 3014/H.R. 1856)

Background and Summary of Legislation

Algae are microscopic, single-celled organisms present in aquatic environments. Under normal conditions, these organisms are benign and serve a critical role as energy producers at the base of aquatic food webs, supporting the growth of higher organisms. Under certain circumstances, however, the population of a single algal species or several related species can rapidly increase in abundance, creating what is referred to as an 'algal bloom.' Algal blooms have many adverse effects on ecosystems and human health. 'Harmful algal blooms' (HABs) are blooms that produce toxins dangerous to humans and aquatic animals. 'Hypoxia,' caused by the decomposition of algal blooms, is a condition where oxygen levels in the water become depleted to levels unable to support aquatic life.

HABs have occurred throughout recorded history, however in the past 30 years the rate of occurrence and the duration of HABs have increased substantially. In the past year alone, HABs were implicated in the death of 72 manatees in Florida and 57 dolphins and 319 sea lions in Southern California. Warnings for people to avoid swimming because of HABs were posted in parts of the Chesapeake Bay and Lake Erie for much of the summer of 2003. HABs present a major threat to aquatic environments and to human health because of the toxins released during the events. These compounds can kill or injure large quantities of aquatic animals that come in direct contact with them. Also, the toxins can accumulate in animals that are not susceptible and cause illness when they are later consumed by humans, who are susceptible to the toxins. Some toxins are so potent that consumption of a single contaminated clam or mussel can be enough to cause illness. Humans may also be harmed directly by skin contact or inhalation of spray from toxin-contaminated water. To protect the public when harmful algae are detected, State and local governments must close beaches to swimmers and shellfish beds to commercial and recreational harvesting, and seafood distributors may need to recall already harvested shellfish.

Average economic impacts from HABs total $50 million per year in the United States, although severe single events have cost that amount alone to localities. The economic impacts of HABs include costs associated with conducting research and monitoring programs; short-term and permanent closures of harvestable shellfish and fish stocks; reductions in seafood sales; mortalities of wild and farmed fish, shellfish, submerged aquatic vegetation, and coral reefs; declines in tourism; and treatment of human illness.

Hypoxia occurs when an algal bloom dies and is decomposed by bacteria in the water. The decomposition process consumes oxygen, creating an environment in which plants and animals cannot survive. Concern about hypoxia has focused primarily on the Gulf of Mexico, where a hypoxic zone the size of New Jersey appears each summer and persists for much of the season. This renders the affected area, which normally contains some of the most valuable fisheries in the United States, essentially lifeless. Other areas of

the country that experience chronic hypoxia include the Chesapeake Bay, Long Island Sound, and Sarasota Bay. In 2003, the hypoxia in the Chesapeake Bay was the worst ever observed, with reports of crabs leaping out of the water gasping for oxygen. The most recent analysis by the National Oceanic and Atmospheric Administration (NOAA) indicates that more than half of the country's estuaries experience hypoxia at some time each year.

Most experts agree that the major cause of hypoxia is nutrient pollution in the watersheds of coastal areas. The dead zone in the Gulf of Mexico illustrates the regional and national scale of this problem. The Mississippi River Basin includes drainage from 31 states and carries farm chemicals, treated sewage discharge, storm water runoff, and pollutants from factories and refineries to the Gulf. Given the economic importance and large geographic distribution of the pollutant sources, this presents a challenging national management problem.

Hypoxia can be caused by any type of algal bloom, not only by blooms of toxin-producing algae. Macro algal, or seaweed, blooms also can lead to hypoxia. Numerous factors, including nutrient pollution and introduction of invasive species from ballast water, cause macroalgal blooms. The result of these seaweed blooms can be shading or smothering of other organisms that need sunlight to survive, habitat degradation, and hypoxia as the seaweeds decompose.

In 1997, an outbreak of Pfiesteria piscicida focused public and Congressional attention on harmful algal blooms in the Chesapeake Bay and was partly responsible for prompting the *Harmful Algal Bloom and Hypoxia Research and Control Act of 1998* (HABHRCA). The legislation was referred to the Committee on Science, in addition to the Committee on Resources, and became Title VI of Public Law 105–383, the *Coast Guard Authorization Act of 1998*. HABHRCA established an Interagency Task Force on HABs and Hypoxia and required four reports from that task force: the National Harmful Algal Bloom Assessment, the Gulf of Mexico Hypoxia Assessment, the Gulf of Mexico Hypoxia Action Plan, and the National Hypoxia Assessment. The first three were published; the last is finished and awaiting publication. Additionally, a Mississippi River/Gulf of Mexico Watershed Nutrient Task Force was established to implement the Gulf of Mexico Action Plan. This watershed task force consists of federal, State and local stakeholders and meets regularly to discuss the implementation process.

HABHRCA authorized funding for HAB and hypoxia research through NOAA. In particular, the Act supported the Ecology and Oceanography of Harmful Algal Blooms (ECOHAB) program that the Clinton Administration had launched in 1996. This program supports basic research necessary to understand HABs and to produce models to forecast bloom development, persistence and toxicity. Grant applications are solicited from universities, private research institutions, and federal agencies and are awarded through a merit-reviewed system. NOAA coordinates ECOHAB with the Environmental Protection Agency (EPA), the National Science Foundation (NSF), the U.S. Department of Agriculture (USDA), the Department of the Interior, the National Aeronautics and Space Administration (NASA), and the Office of Naval Research (ONR).

HABHRCA also supports the Monitoring and Event Response for Harmful Algal Blooms (MERHAB) program, in which local resource managers and scientific institutions form partnerships to enhance existing water and shellfish monitoring programs with new technology, with the ultimate goal of building sustainable regional partnerships that provide managers with crucial information in time for critical decisions needed to mitigate HAB impacts.

The authorizations in HABHRCA expired in fiscal year (FY) 2000, however NOAA has continued to receive around $17 million annually for HAB and hypoxia research. HABs and hypoxia continue to affect communities throughout the United States and there remains much to learn about what can be done to control these events. The research performed under these programs can help local resource managers develop tools for quickly detecting HABs, providing them longer lead time in warning the public about swimming and seafood consumption. Additionally, while research under the 1998 Act provided insights into many marine HAB events, the area of freshwater HABs has not received as much attention. Freshwater HABs are increasing in occurrence, especially in the Great Lakes, and are not as well understood.

Legislative History

Congressman Vernon J. Ehlers introduced H.R. 1856, the *Harmful Algal Bloom and Hypoxia Research Amendments Act of 2003,* on April 29, 2003, at which time the bill was referred to the Committee on Science, and, in addition, to the Committee on Resources. On March 13, 2003, the Environment, Technology, and Standards Subcommittee held a hearing on the state of the science in understanding, predicting, and responding to HABs and hypoxia.

The Subcommittee on Environment, Technology, and Standards met on June 5, 2003 to consider the bill. Two amendments were adopted by voice vote. The Subcommittee favorably reported the bill, H.R. 1856, as amended, by voice vote.

On July 22, 2003, the Committee on Science considered H.R. 1856. The Committee adopted an amendment by voice vote. The Committee favorably reported the bill as amended, by voice vote. The Committee on Science filed H.Rept. 108–326 on October 24, 2003. The measure was then referred to the Committees on Transportation and Infrastructure and Resources. The measure was discharged by the Committees of Referral on April 2, 2004.

The House considered H.R. 1856 on July 7, 2004 and it passed as amended. The Senate received H.R. 1856 on July 8, 2004 and referred it to the Senate Committee on Commerce, Science, and Transportation. The companion bill, S. 3014, passed the Senate without amendment on November 20, 2004. The House considered S. 3014 on November 20, 2004 and it passed by unanimous consent. The President signed S. 3014 on December 10, 2004, which became P.L. 108–456.

1.16—P.L. 108–458, INTELLIGENCE REFORM AND TERRORISM PREVENTION ACT OF 2004 (S. 2845/H.R. 10)

Background and Summary of Legislation

On November 27, 2002, President Bush signed legislation creating the National Commission on Terrorist Attacks Upon the United States—more commonly known as the 9/11 Commission. The Commission was directed to investigate the "facts and circumstances relating to the terrorist attacks of September 11, 2001." To fulfill its mandate, the 9/11 Commission reviewed over 2.5 million pages of documents, conducted interviews of some 1,200 individuals in ten countries, and held 19 days of public hearings featuring testimony from 160 witnesses. On July 22, 2004, the 9/11 Commission issued its report on the investigation. S. 2845, the *9/11 Recommendations Implementation Act,* is in response to the recommendations made in this report.

S. 2845 aims to improve the security of the United States by strengthening the organizations and authorities of the United States intelligence community. It will provide for reform of government organizations and systems, improve terrorism prevention and prosecution, increase border security, and enhance international cooperation and coordination. The overall goals of this legislation are to prevent terrorist attacks against the United States and its interests and to better position the intelligence community to meet the global threats of the future.

S. 2845 includes several provisions that are relevant to the Science Committee. It amends the Clinger-Cohen Act to provide for enhanced agency planning for information security needs. It also enhances the inter-operability of public safety communications by establishing an inter-operability program within the Department of Homeland Security (DHS) Science and Technology Directorate. DHS will operate the program in collaboration with the Department of Commerce and the Federal Communications Commission. The bill authorizes a total of $117,358,000 for the program over five years (FY 2005 to 2009).

S. 2845 also includes many provisions to improve transportation security. It requires DHS and the Department of Transportation to develop a National Strategy for Transportation Security, which will include research and development (R&D) objectives in support of transportation security needs. An additional $20 million is authorized for R&D on advanced biometric technology applications to aviation security, and $1 million is authorized for a competitive center of excellence that will develop and expedite the Federal Government's use of biometric identifiers. The bill also instructs the Transportation Security Administration to consult the National Institute of Standards and Technology on the use of biometrics technology in airport access control systems.

Several other DHS R&D programs are authorized in S. 2845, including $250 million for R&D and installation of detection systems for biological, chemical, radiological, and explosive materials; $100 million for R&D into improved explosive detection systems for aviation security; and $100 million for R&D related to enhanced air cargo security technology as well as for deployment and installation of enhanced air cargo security technology (a grant program for

technology development is required under this provision as well). All of these efforts are to be carried out by the Transportation Security Administration (TSA).

Other provisions related to the Science Committee's jurisdiction are: (1) establishment of an Office of Geospatial Management within the DHS Office of the Chief Information Officer; (2) a sense of Congress that the Secretary of Homeland Security should promote national preparedness standards; (3) a sense of Congress that Congress must pass legislation in the first session of the 109th Congress to reform the system for distributing grants to enhance State and local government terrorism preparedness; (4) provision of the Director of National Intelligence with access to the capabilities of the Department of Defense and the Department of Energy national laboratories, including the National Infrastructure Simulation and Analysis Center; and (5) establishment of pilot programs by DHS on the northern U.S. border that test advanced technologies for border security and on the southwestern U.S. border that test systematic surveillance by remotely piloted aircraft.

Legislative History

On September 24, 2004 Speaker of the House Dennis Hastert introduced H.R. 10. The measure was referred to the Permanent Select Committee on Intelligence, and in addition to the Committees on Armed Services, Education and the Workforce, Energy and Commerce, Financial Services, Government Reform, International Relations, the Judiciary, Rules, Science, Transportation and Infrastructure, Ways and Means, and Select Homeland Security. The Committee on Science was granted an extension for the referral of H.R. 10 on October 4, 2004 and discharged the measure on October 5, 2004. The House passed H.R. 10 on October 8, 2004 by: Y–282; N–134; Roll Call No. 523.

On October 16, 2004 the House passed the Senate companion bill, S. 2845, as amended, and asked for a conference. The Committee of Conference filed H.Rept. 108–796 on December 7, 2004. The House agreed to the resulting conference report on December 7, 2004 and the Senate agreed to the conference report on December 8, 2004. The President signed the bill on December 17, 2004, and it became P.L. 108–458.

1.17—P.L. 108–492, COMMERCIAL SPACE LAUNCH AMENDMENTS ACT OF 2004 (H.R. 5382)

Background and Summary of Legislation

H.R. 5382, the *Commercial Space Launch Amendments Act of 2004,* was designed to promote the development of the emerging commercial human space flight industry by putting in place a clear, balanced regulatory regime. The bill was drafted as an amendment to the existing Commercial Space Launch Act to minimize disruption and confusion.

The bill assigned to the Secretary of Transportation jurisdiction over commercial human space flight and requires the Secretary to craft a streamlined experimental certification process for suborbital reusable launch vehicles. Pursuant to the legislation, the Secretary of Transportation must ensure that only one license or permit is re-

quired to conduct human space flights. By its licensing or permitting of flights, the United States does not certify the safety of the flights for passengers or crew.

The bill required the Secretary of Transportation to protect the general public health and safety when licensing commercial human space flights. The bill also addressed qualifications for crew and space flight participants. Specifically, the crew must receive training and satisfy medical standards. Space flight participants must undergo appropriate medical exams and training requirements, and must provide written informed consent for their participation. For the first eight years after enactment of the legislation, the Secretary of Transportation may only issue regulations governing the design or operation of a launch vehicle if the design or operation has indicated likely safety problems through operational experience.

The bill extended the existing liability indemnification regime to the commercial human space flight industry, but excludes launches under an experimental permit.

Legislative History

On November 18, 2004 Mr. Rohrabacher introduced, along with Mr. Boehlert and Mr. Gordon, H.R. 5382, *Commercial Space Launch Amendments Act of 2004,* which was solely referred to the Committee on Science. On November 19, 2004, the Committee discharged the measure and the House agreed to suspend the rules and debate the bill. On November 20, 2004 the House agreed to the motion to suspend the rules and pass H.R. 5382 by: Y–269; N–129; Roll Call No. 541. On the same day the measure was received in the Senate and held at the desk. The Senate passed H.R. 5382, without amendment, by unanimous consent on December 8, 2004—clearing the measure for the President. The bill was presented to the President for signature on December 16, 2004. The President signed H.R. 5382, *Commercial Space Launch Amendments Act of 2004,* on December 23, 2004, which became Public Law 108–492.

Chapter II—Other Legislative Activities of the Committee on Science

2.1—H.R. 6, ENERGY POLICY ACT OF 2004

Background and Summary of Legislation

H.R. 6 is omnibus energy legislation, whose stated purpose is "To enhance energy conservation, research and development and to provide for security and diversity in the energy supply for the American people, and for other purposes." The Science Committee has jurisdiction over part of the bill, primarily the authorization of Research and Development at the U.S. Department of Energy, but also the reauthorization of Price-Anderson and research, development, demonstration and commercial application programs authorized in other titles including Hydrogen, Clean Coal, and Vehicles.

The Science Committee's Energy research bill, H.R. 238 was introduced by Chairman Boehlert and Ranking Member Ralph Hall on January 8, 2003 and after amendment in committee, was incorporated in great part into H.R. 6 (see Sec. 2.2 on H.R. 238 below). The conference report for H.R. 6 passed the House, but failed to pass the Senate. A separate authorization of the DOE's computing research program (see Sec. 1.12, P.L. 108–423/H.R. 4516 above) was passed by both Houses and signed into law.

Legislative History

Mr. Tauzin introduced H.R. 6, *Energy Policy Act of 2003,* on April 7, 2003. It was referred to the Committee on Energy and Commerce and, in addition, to the Committees on Science, Ways and Means, Resources, Education and the Workforce, Transportation and Infrastructure, Financial Services and Agriculture.

On April 9, 2003. the Committees of Referral discharged the bill. The Committee on Rules filed H.Rept. 108–69 on H.Res. 189, providing for consideration of H.R. 6. On April 10, 2003, the House completed general debate and began consideration of amendments. The House passed H.R. 6 on April 11, 2003, by: Y–247; N–175; Roll Call No. 145.

On April 29, 2003, H.R. 6 was received in the Senate and held at the desk. The Senate passed H.R. 6 on July 31, 2003, after agreeing to an amendment in the nature of a substitute, by a voice vote. The Senate insisted on its amendment, requested a conference with the House, and agreed to appoint conferees. On September 4, 2003, the Senate appointed the following conferees: Senators Domenici, Nickles, Craig, Campbell, Thomas, Grassley, Lott, Bingaman, Dorgan, Graham, FL, Wyden, Johnson, Baucus.

On September 4, 2003, the House disagreed with the Senate amendment to H.R. 6 and agreed to a conference. On September 5, 2003, the Speaker appointed the following House conferees—from the Committee on Science: For consideration of Sections 11009, 11025, 12301–12312, 14001–14007, 14009–14015, 14029, 15021–15024, 15031–15034, 15041, 15045, Division B, Section 30301, Division E, and Division F of the House bill and Sections 501–507, 509, 513–516, 770–772, 807–809, 814–816, 824, 832, 1001–1022, Title XI, Title XII, Title XIII, Title XIV, Sections 1502, 1504–1505, Title XVI, and Sections 1801–1805 of the Senate

amendment, and modifications committed to conference: Representatives Boehlert, Biggert, and Hall. On September 5, 2003, the Speaker appointed Mr. Costello in lieu of Mr. Hall of Texas for consideration of Division E of the House bill, and Mr. Lampson in lieu of Mr. Hall of Texas for consideration of Section 21708 and Division F of the House bill, and Sections 824 and 1223 of the Senate amendment and modifications committed to conference.

On November 17, 2003, the Committee of Conference filed H.Rept. 108–375. The House agreed to the conference report on November 18, 2003 by: Y–246; N–180; Roll Call No. 630—clearing the measure for the Senate. The Senate considered the conference report on November 19, 20, 21, 2003. No further legislative action was taken on this measure in the 108th Congress.

2.2—H.R. 238, Energy Research, Development, Demonstration, and Commercial Application Act of 2003

Background and Summary of Legislation

H.R. 238, *Energy Research, Development, Demonstration and Commercial Application Act of 2003,* authorizes R&D funding, enumerates goals and establishes new administrative procedures for energy research, development, demonstration and commercial application programs. The first three sections of Title One include quantitative near-term and long-term goals for energy efficiency, distributed energy and electric energy systems, renewable energy, fossil energy, nuclear energy, and hydrogen. Title I authorizes programs in: energy efficiency; distributed energy and electric energy systems, renewable energy, nuclear energy, fossil energy, science, hydrogen and management. Title II designates the head of the Office of Science as an Assistant Secretary and transfers health and nuclear regulation at DOE non-military labs to the Occupational Safety and Health Administration and the Nuclear Regulatory Commission (NRC). It also includes other non-R&D management provisions. Title III establishes demonstration program of alternative fuel, clean diesel and fuel cell school buses. Title IV establishes a demonstration program of alternative fueled, advanced vehicles and supports infrastructure used in inter-modal transportation. Title V authorizes a Clean Coal Initiative involving projects that meet technical, environmental, and financial criteria. It also establishes clean coal "centers of excellence" at universities.

Legislative History

H.R. 238 was introduced by Chairman Sherwood Boehlert on January 8, 2003 and referred to the Committee on Science and the Committee on Resources. On February 20, 2003 it was referred to the Subcommittee on Energy. On March 20, 2003 the Subcommittee discharged the bill. The Committee on Science met on April 2, 2003 and ordered the measure reported, as amended, by a voice vote. On May 22, 2003, the Committee filed H.Rept. 108–128, Part I. Provisions of H.R. 238 were incorporated into H.R. 6, the *Energy Policy Act of 2004.* See H.R. 6 for further legislative action.

2.3—H.R. 912, CHARLES 'PETE' CONRAD ASTRONOMY AWARDS ACT

Background and Summary of Legislation

H.R. 912, the *Charles 'Pete' Conrad Astronomy Awards Act,* was named to honor Pete Conrad for his tremendous contributions to the aerospace community over the last four decades as an astronaut and an explorer of the highest caliber. The bill creates an awards program for amateur astronomers who discover new near-Earth asteroids and contribute the greatest service to the Minor Planet Center of the Smithsonian Astrophysical Observatory. H.R. 912 would help augment existing government capabilities for tracking, monitoring, and cataloguing natural space objects by promoting private citizens to observe the heavens.

Legislative History

On February 25, 2003, Representative Dana Rohrabacher introduced H.R. 912, *Charles 'Pete' Conrad Astronomy Awards Act,* a bill to award amateur astronomers for their outstanding contributions to tracking and discovering near-Earth asteroids, which was solely referred to the Committee on Science. The measure was referred to the Subcommittee on Space and Aeronautics on March 17, 2003 and on October 8, 2003, the Subcommittee considered the bill and ordered the measure reported, without amendment, to the Full Committee by a voice vote. The Committee considered the measure on February 4, 2004 and reported the bill, as amended, by a voice vote. The Committee filed H.Rept. 108–418 on February 11, 2004. On March 3, 2004, the House agreed to suspend the rules and pass H.R. 912, as amended, by: Y–404; N–1; Roll Call No. 35. The measure was received in the Senate on March 4, 2004 and referred to the Committee on Commerce, Science, and Transportation.

2.4—H.R. 1081, AQUATIC INVASIVE SPECIES RESEARCH ACT

Background and Summary of Legislation

Aquatic invasive species damage infrastructure, disrupt commerce, crowd out native species, reduce biodiversity and threaten human health. Non-native species have been brought into the U.S., both intentionally and unintentionally, since the European discovery of the New World. Trappers introduced nutria (a rodent similar to a muskrat) to bolster the domestic fur industry, others introduced the purple loosestrife plant because it added rich color in gardens, but both have now become serious threats to wetlands. Many unintentional introductions have resulted from species hitching a ride in ships, crates, planes, or soil coming into the U.S. Zebra mussels, for example, came into the Great Lakes through ballast water from ships.

Most non-native species do not survive because the new environment does not meet the species' biological needs. In many cases, however, the new species will find favorable conditions, such as lack of natural enemies, or an environment that fosters propagation, that allow it to survive and thrive in a new ecosystem. Only a small fraction of these non-native species become 'invasive species', which are defined as plants, animals, microorganisms or viruses that are: (1) non-native to the ecosystem under consideration,

and (2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health. However, this small fraction has caused enormous economic and environmental damage.

One example of an invasive species is the zebra mussel, which was introduced into the Great Lakes in the mid-1980s through the ballast water of ships. Ballast water is water carried by ships to provide stability and adjust a vessel's trim for optimal steering and propulsion. Ballast water is considered by many scientists to be the primary pathway by which aquatic invasive species are introduced into U.S. waters. Zebra mussels clog lakes and waterways and adversely affect fisheries, public water supplies, irrigation, water treatment systems, and recreational activities, and have been an immense financial burden on entities in the Great Lakes. In saltwater habitats, the European green crab has been associated with the demise of the soft-shell clam industry in New England, with an estimated cost to the industry of $44 million a year. While precise economic impacts are difficult to assess, a study by Cornell University scientists estimates that the total annual economic losses and associated control costs of invasive species (both aquatic and terrestrial) in the U.S. is about $137 billion a year.

Invasive species also cause environmental damage that is even more difficult to quantify. For example, sea lamprey control measures in the Great Lakes cost approximately $10 to $15 million annually. However, we do not have a good measure of the cost of lost fisheries due to this invader. In fact, invasive species are now the number two threat to endangered species, right behind habitat loss. Quantifying the loss due to extinction of these species is nearly impossible.

Congress has long recognized the damage that invasive species cause. One of the more recent congressional actions was the passage of the *Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990*. This legislation established a federal program to prevent the introduction of, and to control the spread of, unintentionally introduced aquatic nuisance species. In 1996, Congress amended the 1990 Act with the *National Invasive Species Act* (NISA). This legislation continued to focus on aquatic invasive species by creating a voluntary national ballast water management program and a mandatory ballast water management program for ships entering the Great Lakes. Ballast water management can be done in two ways: (1) ballast water can be exchanged at sea, replacing species-rich water picked up at ports with open ocean water that contains far fewer organisms, and (2) ballast water can be treated with a technology, such as chlorination. To date, there are no treatment technologies widely used to treat ballast water. NISA also required the Coast Guard to study and report to Congress on the effectiveness of ballast exchange or other technologies in controlling invasive species.

However, NISA and the underlying 1990 legislation have been criticized for not going far enough to prevent the introduction of aquatic invasive species. Further, the agencies responsible for implementing the Act have been criticized for failing to carry out many of its provisions, including setting standards for ballast water treatment, conducting ecological assessments, and pre-

scribing management actions. In response, agencies have argued that the law is ambitious and that funding has been inadequate. In addition, these failures have also been driven in part by a lack of scientific information on the underlying processes that lead to invasion.

The research that has been done has been largely reactive, focusing on how to control specific invasive species, such as the sea lamprey, once they are already established and causing harm. Once an invasive species is established, it is virtually impossible to eradicate and very difficult to control. Additional research on how to manage species at the earlier stages of the invasion process, when prevention, eradication and restoration are still possible, is critical and would allow for more proactive management. H.R. 1081 would provide a foundation for our understanding of how to prevent invasive species from ever entering U.S. waters.

For example, it is difficult to know how to prevent invasive species from entering the United States without a good understanding of how they get here, an understanding that H.R. 1081 would develop through the pathway surveys conducted in the bill. Planned importations of non-native species can be more effectively screened for their potential to invade with a thorough understanding of the characteristics that make a species invasive and an ecosystem vulnerable, a profile that would be created in this legislation. Finally, without good technologies to eradicate species in ballast water, it is difficult to prevent invasive species from entering U.S. waters through ships' ballasts (a known pathway). H.R. 1081 authorizes the development and demonstration of such technologies. These are just a few of the critical management questions that will be informed by research conducted under this legislation.

One of the major barriers to the prevention of the introduction of invasive species is the lack of a clear, mandatory standard for the treatment of ballast water in ships to prevent introduction in non-native species. It is the responsibility of the Coast Guard to set this standard, however, it has been difficult to determine an environmentally protective standard without adequate research on how the risk of establishment relates to the quantity of introduced species, or conditions of introduction. Section 9 of H.R. 1081 establishes a research program to support the setting, implementation and evaluation of ship pathway standards.

Invasive species enter U.S. waters every day bringing with them greater environmental and economic harm. While the invasive species cost the United States billions in damages, very little is invested in how to prevent introduction and avoid this damage. More research, targeted at how to prevent these species from arriving in the first place, is critical to a more proactive and cost-effective invasive species policy.

Legislative History

Congressman Vernon J. Ehlers introduced H.R. 1081, the *Aquatic Invasive Species Research Act* on April 29, 2003, at which time the bill was referred to the Committee on Science, and in addition to the Committees on Transportation and Infrastructure, Resources, and House Administration. The Committee on Science ordered the measure reported, as amended, by a voice vote on June

4, 2003. H.R. 1081 was discharged by the Committees of Referral on April 2, 2004.

2.5—H.R. 1292, REMOTE SENSING APPLICATIONS ACT OF 2004

Background and Summary of Legislation

H.R. 1292, the *Remote Sensing Applications Act of 2004,* was introduced because the full range of applications from NASA's Earth Science and commercial remote sensing satellite data and other forms of geospatial information to meet the needs of State, local, regional, and tribal agencies has not been adequately explored or exploited. This bill establishes a NASA program of competitively-awarded grants for pilot projects that use government and commercial remote sensing capabilities and other sources of geospatial information to address State, local, regional and tribal agency needs. It authorizes $15,000,000 for each of the fiscal years 2005 through 2009 for the program.

Legislative History

On March 13, 2003, Representative Mark Udall introduced H.R. 1292, *Remote Sensing Applications Act of 2003,* a bill to encourage the development and integrated use by the public and private sectors of remote sensing and other geospatial information. The measure was solely referred to the Committee on Science. On April 28, 2003, H.R. 1292 was referred to the Subcommittee on Space and Aeronautics. The Subcommittee ordered the measure reported, without amendment, to the Full Committee on October 8, 2003. The Committee considered the measure on February 4, 2004 and ordered the bill reported, as amended, by a voice vote. On February 18, 2004, the Committee filed H.Rept. 108–423.

2.6—H.R. 1297, COLUMBIA ORBITER MEMORIAL ACT

Background and Summary of Legislation

On January 16, 2003, at 10:39 a.m., the STS–107 *Columbia* launched into orbit for a 16-day microgravity research mission. *Columbia* was the oldest orbiter in the Shuttle fleet. In 1981, it was the first Space Shuttle to fly into Earth orbit. This was the 113th Shuttle Mission for *Columbia.* On board were seven astronauts: Crew Commander Rick Husband (Colonel, U.S. Air Force), Shuttle Pilot William McCool (Commander, U.S. Navy), Payload Commander Michael Anderson (Lieutenant Colonel, U.S. Air Force), Mission Specialist Kalpana Chawla, Ph.D., Mission Specialist David Brown (Captain, U.S. Navy), Mission Specialist Laurel Blair Salton Clark, M.D. (Captain, U.S. Navy), and Payload Specialist Ilan Ramon (Colonel, Israel Air Force).

At 8:15 a.m. EST, on February 1, 2003, *Columbia* decelerated to begin the re-entry phase into the atmosphere for a planned landing at Kennedy Space Center. At 8:52 a.m., *Columbia* crossed over the coast of California. At 8:58 a.m., *Columbia* was over New Mexico. Loss of communication with the crew and of data occurred shortly after 8:59 a.m. About 16 minutes before its scheduled landing, the Shuttle broke up while traveling at 12,500 miles per hour at an al-

titude of 207,135 feet over East Central Texas, resulting in the loss of both the *Columbia* and its crew.

H.R. 1297 would authorize the construction of a memorial honoring the seven crew members of STS–107 *Columbia,* all of whom excelled in their careers and died while fulfilling their dreams of traveling in space.

Legislative History

Referred to the Committee on Veterans' Affairs, and in addition to Science on March 13, 2003. The Committee on Science ordered the measure reported, without amendment, by a voice vote on March 26, 2003. The Committee on Veterans' Affairs ordered the measure reported, in the nature of a substitute, by unanimous consent on April 3, 2003. The Committee on Veterans' Affairs filed H.Rept. 108–62, Pt. 1 on April 8, 2003. The Committee on Science discharged the measure on April 8, 2003. Provisions of H.R. 1297 were incorporated into Title III of H.R. 1559, *Emergency Wartime Supplemental Appropriations Act, 2003,* which was signed by the President and became P.L. 108–11 on April 16, 2003.

2.7—H.R. 1644, ENERGY POLICY ACT OF 2003

Background and Summary of Legislation

This is the portion of the omnibus energy legislation reported out by the Energy and Commerce Committee. It was subsequently referred to the Science Committee. Since the Science Committee had already passed H.R. 238, the Committee discharged the bill after an exchange of letters acknowledging the Committee's area of shared jurisdiction with Energy and Commerce. Four bills, including H.R. 1644 and H.R. 238, became the basis for H.R. 6, the omnibus energy legislation considered on the House floor. (See Sec. 2.1 above for a description of H.R. 6.)

Legislative History

Representative Joe Barton introduced H.R. 1644 on April 7, 2003. It was referred to the Committee on Energy and Commerce and, in addition, to the Committees on Science, Resources, Education and the Workforce, and Transportation and Infrastructure. On April 8, 2003 the Committee on Energy and Commerce filed H.Rept. 108–65, Part 1. The Committees of Referral discharged the measure on April 9, 2003. Provisions of H.R. 1644 were incorporated into H.R. 6, *Energy Policy Act of 2003.* See H.R. 6 for further legislative action.

2.8—H.R. 1836, CIVIL SERVICE AND NATIONAL SECURITY PERSONNEL IMPROVEMENT ACT

Background and Summary of Legislation

H.R. 1836, *Civil Service and National Security Personnel Improvement Act,* provided NASA flexibility in paying salaries and bonuses, as well as in hiring and retaining employees, that were not provided in existing civil service law. Specifically, the bill provided NASA with authority to: (1) pay recruitment, redesignation, relocation, and retention bonuses; (2) make term appointments of one to

six years and take related personnel actions; (3) fix basic rates of pay for critical need, senior-level positions; (4) extend intergovernmental personnel act assignments to up to four years; (5) involve in demonstration projects such numbers of individuals as determined by NASA's Administrator (current law limits the number to 5,000); and (6) provide voluntary separation incentive payments in excess of the dollar amount limitation otherwise applicable.

Additionally, the bill required the Administrator to submit a written workforce plan and an evaluation to specified congressional committees and obtain approval of the plan by the Office of Personnel Management (OPM). The bill also authorized the Administrator to: (1) arrange for the assignment of a NASA employee to a private sector organization for up to two years or of an employee of a private sector organization to NASA; (2) appoint distinguished scholars as employees, without regard to specified competitive service examination and certification provisions; (3) pay travel, transportation, and relocation expenses of new appointees subject to the conditions currently applicable to employees transferred in the Government's interest; (4) deem periods of certain non-federal service as federal service for certain newly appointed employees for annual leave qualification purposes (and provides for annual leave accrual for certain senior-level employees based on rate of pay); (5) appoint individuals for limited terms to Senior Executive Service positions; and (6) set the pay of a General Schedule employee at any step within the pay range for the grade of the position based on the employee's superior qualifications or NASA's special need.

Finally, the bill required the Administrator to establish a National Aeronautics and Space Administration Science and Technology Scholarship Program to award scholarships (for up to four academic years) in exchange for service agreements in order to recruit and prepare students for NASA careers.

Legislative History

Referred to the Committee on Government Reform, and in addition to the Committee on Armed Services and the Committee on Science on April 29, 2003. The Committee on Government Reform filed H.Rept. 108–116, Pt. 1 on May 19, 2003. The Committee on Science discharged on July 25, 2003. The Committee on Armed Services discharged on July 25, 2003. Referred to the Committee on Ways and Means on June 3, 2003. The Committee on Ways and Means discharged on July 25, 2003.

2.9—H.R. 2450, HUMAN SPACE FLIGHT INDEPENDENT INVESTIGATION COMMISSION ACT OF 2003

Background and Summary of Legislation

H.R. 2450, the *Human Space Flight Independent Investigation Commission Act of 2003,* directs the President to establish an independent, nonpartisan commission within the executive branch to investigate and report to the President, Congress, and the public on any accident or deliberate act that results in the loss of: (1) a space shuttle; (2) the International Space Station or its operational viability; (3) any other U.S. space vehicle carrying humans; (4) any space vehicle carrying U.S. citizens; or (5) a crew member or pas-

senger of any such space vehicle. The bill also requires the President to issue an executive order establishing such a commission within seven days after such an incident.

Requires the National Transportation Safety Board to: (1) assume responsibility for investigation of such an incident immediately after its occurrence; and (2) transfer investigative responsibility to such a commission as soon as the commission holds its first meeting.

Legislative History

On June 12, 2003, Representative Gordon, along with 19 other co-sponsors, introduced H.R. 2450, *Human Space Flight Independent Investigation Commission Act of 2003,* which was solely referred to the Committee on Science. The bill was referred to the Subcommittee on Space and Aeronautics on June 19, 2003. On October 8, 2003, the Subcommittee ordered the measure reported, as amended, to the Full Committee by a voice vote.

2.10—H.R. 2801, Minority Serving Institution Digital and Wireless Technology Opportunity Act of 2003

Background and Summary of Legislation

During the late 1990s, the U.S. Department of Commerce issued a series of reports that documented the existence of a "digital divide"—the disparity in access to technology between Caucasian and minority populations—at minority serving institutions (MSIs). MSIs are defined by the Higher Education Amendments of 1998 to be institutions of higher education that have a combination of different minority groups totaling at least 50 percent of their enrollment.

The digital divide series of reports prompted the National Association for Equal Opportunity in Higher Education (NAFEO) to assess the computing resources, networking and connectivity of its member historically black colleges and universities (HBCUs). The study found that 88 percent of HBCUs had access to T–1 lines, the minimum standard for connectivity and generally considered insufficient to support capabilities beyond Internet and World Wide Web connectivity. Larger bandwidth, for faster connections and more web-based applications, was available to half of reporting institutions. The study also found the larger problem not to be the availability of networking capacity, but rather its use. Even though high-speed lines were available at half of the institutions, only 7.5 percent reported using them. Similarly, of the 29 percent of HBCUs with access to wireless technology, only 43 percent were using it. It was not clear why many HBCUs weren't using high speed connections even when it was available to them, though some speculated that it had to do with finance, lack of strategic planning, faculty motivation and training. Anecdotal information indicates that the problems at other MSIs are similar to those found at the HBCUs.

The purpose of H.R. 2801 is to help close the digital divide, and strengthen the ability of MSIs to provide instruction in digital and wireless network technologies. The bill would establish a $250 million per year grant program, called the Minority Serving Institu-

tion Digital and Wireless Technology Opportunity Program, within the Department of Commerce's Technology Administration. It also directs the Under Secretary of Commerce for Technology to: (1) establish an advisory council to advise on the best approaches toward maximum Program participation by eligible institutions; and (2) ensure that grant awards are made to all types of eligible institutions.

Legislative History

H.R. 2801 was introduced by Representative Randy Forbes and Representative Edolphus Towns on July 21, 2003, and was referred to the Committee on Science and the Committee on Education and the Workforce. It was subsequently referred to the Subcommittee on Research on July 21, 2003 and discharged by the Subcommittee the following day. The Full Committee ordered the measure reported, as amended, by a voice vote on July 22, 2003. The Committee on Science filed report H.Rept. 108–789, Pt. 1 on November 19, 2004.

Note: The bill was originally introduced as H.R. 2183 and established the grant program in the National Science Foundation (NSF). But after consultation with Chairman Boehlert, Senator John McCain (R–AZ) and Senate companion bill sponsor Senator George Allen (R–VA), the legislation was altered and re-introduced as H.R. 2801, and the grant program was moved from NSF to the Department of Commerce.

2.11—H.R. 3245, COMMERCIAL SPACE ACT OF 2003

Background and Summary of Legislation

H.R. 3245, the *Commercial Space Act of 2003,* amends the Commercial Space Launch Act (CSLA) to prohibit CSLA license holders from launching or re-entering a space flight participant unless: (1) the participant has received training and met medical or other standards specified in the license; (2) the participant is informed of the safety record of the launch or re-entry vehicle type; and (3) the launch or re-entry vehicle is marked to distinguish it from an aircraft in a manner specified by the Secretary of Transportation.

The bill also requires the Secretary to create, and report to Congress on progress in implementing a streamlined, cost-effective, and enabling regulatory framework for the U.S. commercial human space flight industry. Additionally, the bill extends current indemnification provisions for commercial space transportation through calendar 2007. The bill also requires the Secretary to arrange with the National Academy of Public Administration to study and report to Congress on the liability risk-sharing regime for U.S. commercial space transportation.

H.R. 3245 redesignates the Department of Commerce's Office of Space Commercialization as the Office of Space Commerce (OSC), and requires the Secretary of Commerce to delegate to the Director of OSC the Secretary's licensing authority for private remote sensing space systems (satellite photo systems). Also, the bill amends the *Technology Administration Act of 1998* to reflect this delegation of authority and to give the Director of OSC responsibility for serv-

ing as Executive Secretary for the Interagency Global Positioning System Executive Board.

Legislative History

On October 2, 2003, Representative Rohrabacher introduced, along with Mr. Gordon and Mr. Hall, H.R. 3245, *Commercial Space Act of 2003,* which was solely referred to the Committee on Science. On October 6, 2003, the measure was referred to the Subcommittee on Space and Aeronautics. The Subcommittee ordered the measure reported, without amendment, to the Full Committee by a voice vote on October 8, 2003.

2.12—H.R. 3266, FASTER AND SMARTER FUNDING FOR FIRST RESPONDERS ACT OF 2004

Background and Summary of Legislation

Arming our first responders with the best technologies, equipment, and training to react in the event of a catastrophic terrorist attack is vital for protection of the Nation. Terrorism preparedness grants for first responders must be allocated quickly to where the risk is greatest.

Since 2001 roughly $11 billion has been appropriated to the Department of Homeland Security (DHS) for distribution to State and local governments for terrorism preparedness. However, in some states, there has been considerable delay in dispensing these funds to first responders. There are numerous reasons for the backup of funds, which H.R. 3266 attempts to rectify, including a lack of advance planning by State and local governments, a confusion at all levels of government regarding grant requirements, timelines, use of funds, and DHS application and obligation procedures. Moreover, DHS terrorism preparedness grant funds currently are allocated to each state-based on rigid and arbitrary formulas that were established immediately after September 11, 2001, instead of formulas based on a comprehensive risk analysis.

H.R. 3266 would reform the manner in which DHS issues grants to enhance the ability of States, local governments, and first responders to prevent, prepare for, mitigate, and respond to acts of terrorism. The bill does not create a new terrorism preparedness grant program. Rather, it directs the Secretary of DHS to establish "essential capabilities" that different types of communities should obtain in order to prepare for potential terrorist acts, improves the grant process by streamlining and speeding the delivery of federal grant assistance for first responders to build these essential capabilities in a measurable fashion, and establishes a consolidated structure for evaluating and prioritizing grant applications based on the level of risk of a terrorist attack.

Sections 3, 7, and 10 are relevant to the Science Committee's jurisdiction and are summarized below.

Section 3 states that only DHS grants to states and regions for the purpose of improving the capabilities of first responders are affected. It directs the Secretary of Homeland Security to establish essential capabilities for terrorism preparedness based on the level of need of the area. The Task Force on Essential Capabilities for First Responders, established by the Secretary, shall aid the Sec-

retary in determining essential capabilities. Section 3 also lists the activities that the grants can be used for and specifically states that they can not be used to supplant local funds or support traditional missions of first responders. Eighty percent of the grant must be made available to the first responders after 45 days and grant recipients are required to submit an annual report. In addition, after two years, a 25 percent matching requirement takes effect. Lastly, this section requires the Secretary to establish national standards for equipment performance and training.

Section 7 states that it is the sense of the Congress that interoperable emergency communications systems that meet national voluntary consensus standards should be developed and promulgated as soon as practicable for use by first responders.

Section 10 authorizes $3,400,000,000 for fiscal year 2006 for making covered grants.

Legislative History

H.R. 3266 was introduced on October 8, 2003 by Representative Christopher Cox and was referred to the Select Committee on Homeland Security and the Committees on Transportation and Infrastructure, the Judiciary, and Energy and Commerce. The measure was later referred to the Committee on Science on April 2, 2004 and discharged that same day.

2.13—H.R. 3550, TRANSPORTATION EQUITY ACT: A LEGACY FOR USERS

Background and Summary of Legislation

H.R. 3550, the *Transportation Equity Act: A Legacy for Users,* is a comprehensive six-year authorization bill to fund the Nation's highway, highway safety, motor carrier safety, and public transportation programs. Authorizations are made from the Highway Trust Fund, which is paid for by taxes on gasoline. This legislation follows two other comprehensive six-year highway bills, the *Intermodal Surface Transportation Efficiency Act* (ISTEA), passed in 1991, and the *Transportation Equity Act for the 21st Century* (TEA–21), passed in 1998.

Several titles of H.R. 3550, including titles authorizing highway safety, motor carrier safety and public transportation programs, contain research provisions within the jurisdiction of the Science Committee. Most of these are found in Title V of the legislation which funds highway research including surface transportation research, technology deployment, training and education, the intelligent transportation systems program, the university transportation centers, and the Bureau of Transportation Statistics.

Legislative History

H.R. 3550 was introduced by Chairman Don Young, Ranking Minority Member Jim Oberstar, Subcommittee Chairman Tom Petri, and Subcommittee Ranking Minority Member William Lipinski and 69 co-sponsors, including Mr. Boehlert and Mr. Ehlers, on November 20, 2003 and referred to the Committee on Transportation and Infrastructure. The Committee on Transportation and Infrastructure met on March 24, 2004 and adopted, by voice vote, an amend-

ment in the nature of a substitute offered by Subcommittee Chairman Tom Petri. Subsequently by unanimous consent, the Committee approved and ordered the bill favorably reported to the House. On March 29, 2004 the Committee on Transportation and Infrastructure filed H.Rept. 108–452, Pt. 1.

The bill was then referred to the Committees on Education and Workforce, Energy and Commerce, Resources, and Science on March 29, 2004. The measure was discharged by the Committees of Referral on March 29, 2004. On April 2, 2004 H.R. 3550 passed the House.

The Senate received H.R. 3550 on April 8, 2004. The Senate passed S. 1072, the Senate companion bill, on May 19, 2004.

On May 20, 2004 the Senate appointed conferees, and on June 3, 2004, the House appointed conferees. Conferences were held on June 9, June 23, and July 7, 2004.

2.14—H.R. 3551, Surface Transportation Research and Development Act of 2004

Background and Summary of Legislation

The U.S. transportation system faces tremendous challenges. Tens of thousands of lives are lost each year on the Nation's highways. More drivers are driving more miles, causing severe congestion. An aging infrastructure is putting a strain on State and local transportation budgets. Constructing and using transportation infrastructure can damage air and water quality and strain natural resources. Changing patterns of where people live and work demand an innovative response to ensure that we meet future needs and limit environmental impacts.

Fundamental improvements to the entire transportation system depend on solid research. Research on pavements can lead to materials that are more durable and last significantly longer than current materials. Research on operations can lead to the design of better road configurations to avoid dangerous intersections or highway merges. Research on information technologies, specifically Intelligent Transportation Systems (ITS), can lead to the development of technologies to manage the transportation system in real time, making it possible to respond to incidents and alter traffic signals instantaneously. Research on the linkages between transportation and the environment can help discover ways to increase mobility while minimizing the impact on the environment and human health. Finally, research in the social sciences, such as on transportation trends, is vital to planners who must make informed decisions to ensure that we meet future transportation needs.

Since passage of the *Intermodal Surface Transportation Efficiency Act* (ISTEA) in 1991 (P.L. 102–240), research and development (R&D) has had a prominent place in the surface transportation authorization bill. Both ISTEA and the subsequent *Transportation Equity Act for the 21st Century* (TEA–21), which was passed in 1998 (P.L. 105–178), contained significant funding for surface transportation research and development. The Science Committee has jurisdiction over surface transportation R&D, and in the 105th Congress the Science Committee reported out the *Surface Transportation Research and Development Act,* H.R. 860. Dur-

ing the 108th Congress, the Science Committee passed H.R. 3551, intended to be a blue print for surface transportation R&D in the larger authorization bill, H.R. 3550, the *Transportation Equity Act: A Legacy for Users* (TEA–LU).

Over the six-year life of TEA–21 (1998–2003), the Federal Government invested approximately $2.9 billion (or about $500 million per year) in surface transportation R&D (primarily highway R&D) under Title V. The funding for these activities came from gas tax receipts deposited in the Highway Trust Fund. Although this is a significant R&D investment, the federal transportation R&D investment under TEA–21 represented less than one percent of federal spending on surface transportation. Many experts see this level of investment as too low. By comparison, the Federal Government invests approximately 10 percent of total health care spending on R&D. While Congress increased funding for overall transportation programs by about 40 percent in TEA–21, funding for transportation R&D remained relatively flat.

In addition, transportation R&D is highly decentralized, with the Federal Government, States, universities, the National Academy of Sciences, and the private sector each playing an important role. In TEA–21, Congress further decentralized R&D by increasing the proportion of R&D funds that went directly to States, while decreasing the federal share of R&D dollars. This decentralization, coupled with inadequate investment, has created significant gaps in the R&D agenda.

H.R. 3551 takes specific steps to increase surface transportation research spending, tie research spending to overall transportation spending, and fill many critical gaps. These gaps include environmental R&D, long-term fundamental research, policy research (addressing such things as changing demographic, economic, and social trends), performance measurement and evaluation R&D, and research addressing institutional barriers to deployment (particularly for ITS technologies).

H.R. 3551 authorizes programs to fill these gaps. These include: authorizing the Surface Transportation Environment Cooperative Research Program (STECRP) and ensuring that the program carries out the agenda developed by the Transportation Research Board; authorizing the Future Strategic Highway Research Program (also laid out in a report by the Transportation Research Board) to address renewal, safety, reliability, and capacity; authorizing greater funding for exploratory advanced research; authorizing a trends research program to look at the impact of changing demographics and a changing economy on the surface transportation system; and authorizing research into the institutional barriers to the deployment of intelligent transportation systems.

H.R. 3551 also strives to ensure the highest quality research by requiring that all research and development grants, contracts and cooperative agreements be peer reviewed and awarded on a competitive basis. It also requires that all research and development activities include a component of performance evaluation to ensure that our dollars are well spent. Finally, H.R. 3551 strengthens the strategic planning requirements to ensure that research is focused on helping to achieve the overall goals of the surface transportation system, such as reducing congestion and increasing safety.

Legislative History

H.R. 3551 was introduced by Chairman Vernon Ehlers on November 20, 2003 and referred to the Committee on Science, in addition to the Committee on Transportation and Infrastructure. On January 28, 2004, the Subcommittee on Environment, Technology, and Standards of the House Science Committee met to consider H.R. 3551. Five amendments were agreed to by voice vote and the Subcommittee favorably reported the bill.

On February 4, 2004, the Full Science Committee met to consider H.R. 3551; two amendments were offered and were agreed to by voice vote. The Committee favorably reported H.R. 3551. On September 7, 2004 the Science Committee filed H.Rept. 108–662.

2.15—H.R. 3598, MANUFACTURING TECHNOLOGY COMPETITIVENESS ACT OF 2004

Background and Summary of Legislation

Manufacturing remains a key sector of the U.S. economy. According to the Bureau of the Census, between 1988 and 2000, the U.S. manufacturing trade balance for advanced technology products remained positive (though shrinking), whereas all other products went from an annual deficit of $100 billion to one of more than $300 billion.

The National Institute of Standards and Technology (NIST) plays a critical role in helping maintain and advance the U.S. manufacturing industry. NIST's two laboratories, in Gaithersburg, MD and Boulder, CO, and its extramural Manufacturing Extension Partnership (MEP) program support research and development (R&D) and technology transfer that are directly relevant to the manufacturing sector's needs.

MEP centers help increase the competitiveness of small- and medium-sized manufacturers in areas involving technological change, lean manufacturing ('lean' principles include perfect first-time quality, waste minimization by removing all activities that do not add value, continuous improvement, flexibility, and long-term relationships), and acquisition of equipment, as well as business organization. MEP center costs are divided approximately equally among the Federal Government, the State the center serves, and the center's clientele, who pay fees for services. The federal share of MEP was funded at approximately $105 million from Fiscal Year (FY) 1998 to FY 2003 before the funding was cut to $39 million in FY 2004. The Administration's FY 2005 request was also $39 million. The $39 million may not be enough to fund all the existing centers, and the Administration has been seeking funds from other agencies to add funds to MEP in FY 2004.

In June 2004, the National Academy of Public Administration (NAPA) published a report on the MEP program that concluded that the MEP program was the only federal program that helped smaller firms modernize and compete successfully. The NAPA report also said that there were emerging challenges facing smaller firms, such as how to economically introduce the use of information technology into small manufacturing enterprises, and that MEP would have to introduce some changes in its current business model to help firms overcome these challenges.

Legislative History

On November 21, 2003, Congressman Vernon J. Ehlers introduced H.R. 3598, the *Manufacturing Technology Competitiveness Act,* which was referred to the Committee on Science.

On March 25, 2004, the Subcommittee on Environment, Technology, and Standards met to consider the bill. An amendment in the nature of a substitute was offered and was adopted by a voice vote. The Subcommittee favorably reported the bill H.R. 3598, as amended, by a voice vote.

On June 16, 2004, the Committee on Science met to consider H.R. 3598. Fourteen amendments were offered and four were adopted by a voice vote and ten were defeated. The motion to adopt the bill as amended passed by a roll call vote of 19 yeas and 13 nays. The Committee on Science filed H.Rept. 108–581 on July 1, 2004.

On July 9, 2004, H.R. 3598 passed the House, as amended, by a voice vote. On July 12, 2004 the Senate received the measure and it was referred to the Senate Committee on Commerce, Science, and Transportation.

2.16—H.R. 3890, TO REAUTHORIZE THE STEEL AND ALUMINUM ENERGY CONSERVATION AND TECHNOLOGY COMPETITIVENESS ACT OF 1988

Background and Summary of Legislation

H.R. 3890 amends the *Steel and Aluminum Energy Conservation and Technology Competitiveness Act of 1988.* The bill authorizes appropriations equal to the fiscal year 2004 appropriation for fiscal year 2005 and $20 million each year for fiscal years 2006 through 2009 for DOE. The bill also includes provisions to include research and development on advanced sheet and bar steels, and the potential for technologies to reduce greenhouse gas emissions as a consideration in research planning. The bill also repeals a section related to programs that have been inactive at the National Institute of Standards and Technology.

Legislative History

On March 4, 2004 Representative Melissa Hart introduced H.R. 3890, a bill *to reauthorize the Steel and Aluminum Energy Conservation and Technology Competitiveness Act of 1988,* which was referred to the Committee on Science.

H.R. 3890 was jointly referred to the Subcommittee on Energy and the Subcommittee on Environment, Technology, and Standards on March 8, 2004. The Subcommittee on Energy held a hearing on the bill on May 20, 2004. The bill was discharged by the Subcommittee on Environment, Technology, and Standards on June 7, 2004. The Subcommittee on Energy held a markup on June 15, 2004 and ordered the measure reported, as amended, to the Full Committee by a voice vote. On June 16, 2004, the Committee considered the measure and ordered it reported, as amended, by a voice vote. The Committee filed H.Rept. 108–579 on July 1, 2004. The House agreed to suspend the rules and pass H.R. 3890, as amended, by a voice vote on July 7, 2004. H.R. 3890 was received

in the Senate and referred to the Committee on Energy and Natural Resources on July 8, 2004.

2.17—H.R. 3970, GREEN CHEMISTRY RESEARCH AND DEVELOPMENT ACT OF 2004

Background and Summary of Legislation

Chemical manufacturing is the source of many products upon which we depend, such as medicines, plastics, fuels, and fabrics. However, chemical manufacturing has also sometimes resulted in harm to human health and the environment because it often uses hazardous materials and generates hazardous byproducts. The goal of green chemistry—most commonly defined as chemistry and chemical engineering that involves the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances—is to minimize or, ideally, to eliminate this harm by using safer materials and manufacturing processes. By considering chemical hazards in the design of products and processes, chemists can design chemicals to be safe, just as they can design them to have other properties, such as color or texture. It is sometimes characterized as "benign by design" to emphasize that it is green intentionally. Examples of green chemistry include the development of pesticide alternatives that are effective at killing target organisms, but are benign to non-target organisms and do not persist in the environment, and the use of the benign solvent supercritical carbon dioxide in dry cleaning processes instead of toxic perchloroethylene.

Besides the inherent advantages to human health and the environment, green chemistry can offer economic advantages and improvements to worker safety, public safety, and national security. However, significant impediments exist that discourage businesses from pursuing such alternatives, such as a workforce unfamiliar with green chemistry, lack of existing green chemistry alternatives, lack of demonstrated green chemistry alternatives, costs of up-front capital investment, lack of regulatory drivers, and inertia.

The *Green Chemistry Research and Development Act of 2004* would direct the President to establish an interagency green chemistry R&D program to promote and coordinate federal research, development, demonstration, education, and technology transfer activities related to green chemistry. The National Science Foundation and the Environmental Protection Agency would lead an Interagency Working Group to coordinate federal green chemistry activities. The Working Group would also include the Department of Energy and the National Institute of Standards and Technology, as well as any other agency the President designates.

Other goals of the program include: (1) examine methods by which the Federal Government can create incentives for use of green chemistry processes and products; (2) facilitate the adoption of green chemistry innovations; (3) expand education and training of undergraduate and graduate students and professional chemists and chemical engineers in green chemistry science and engineering; (4) collect and disseminate information on green chemistry research, development, and technology transfer, including incentives and impediments to development and commercialization; (5) sup-

port economic, legal, and other appropriate social science research to identify barriers to commercialization and methods to advance commercialization of green chemistry; and (6) provide for public input and outreach to be integrated into the program by the convening of public discussions.

The legislation authorizes the program at a level of $33 million in fiscal year (FY) 2005, rising to $38 million in FY 2007, and specifices that such funds must come from within existing authorizations. The program would support R&D grants, including grants for university-industry partnerships, support green chemistry R&D at federal labs, and promote education through curricula development and fellowships.

Legislative History

H.R. 3970 was introduced by Representative Phil Gingrey on March 16, 2004, and was referred solely to the Committee on Science. The Committee held a hearing on the measure on March 17, 2004 and a markup on March 31, 2004, continuing on to April 1, 2004. The Committee ordered the measure reported, as amended, by a voice vote on April 1, 2004. Amendments accepted at this markup included amendments to make technical changes, list green chemistry activities as allowable activities for Manufacturing Extension Partnership centers, make non-profits eligible to participate, and establish partnerships to retrain chemists and chemical engineers in green chemistry.

The Committee filed report H. Rept. 108–462 on the measure on April 14, 2004. On April 21, 2004, the House passed H.R. 3970, as amended, under suspension by: Y–402; N–14; Roll Call No. 121. The measure was received in the Senate on April 22, 2004 and was referred to the Committee on Commerce, Science, and Transportation.

2.18—H.R. 4030, Congressional Medal for Outstanding Contributions in Math and Science Education Act of 2004

Background and Summary of Legislation

Private sector involvement in education, particularly by businesses, is an important though oft-overlooked aspect of the U.S. education system. Today, nearly 70 percent of all school districts now engage in some form of business partnership—an increase of 35 percent since 1990—with businesses contributing an estimated $2.4 billion and 109 million volunteer hours. These relationships can boost student test scores, contribute to overall student achievement, and enhance the student experience.

From a human capital perspective, these relationships between a corporation and a school can boost employee morale, earning the employer, and its employees, recognition as a "good neighbor." In turn, this can improve overall employee satisfaction and productivity. From a financial and community perspective, these relationships can provide a revenue stream to schools while also building customer loyalty for the business. In addition, school improvement can contribute to the economic health of the community.

H.R. 4030 seeks to recognize the outstanding contributions of private sector entities in improving math and science achievement by

directing the National Science Foundation to establish a Congressional Medal for Outstanding Contributions in Math and Science Education awards program. Five medal recipients will be chosen each year by the Director based on their contributions to student achievement in science, technology, engineering, and mathematics. Only private entities that have been involved with a school in a sustained manner for at least two years are eligible. Private entities that partner with a for-profit or non-profit entity are eligible as well.

Legislative History

H.R. 4030 was introduced by Subcommittee on Research Chairman Nick Smith on March 25, 2004, and it was referred solely to the Committee on Science. On March 26, 2004, the measure was referred to the Subcommittee on Research. The Subcommittee held a hearing and markup on March 30, 2004 and ordered the measure reported, as amended, by a voice vote the same day. Amendments adopted at the Subcommittee markup included one to make technical changes and one to clarify that women and minorities are included among those for whom evidence of improved student achievement would be given priority consideration.

The Full Committee ordered the measure reported, as amended to make technical changes, by a voice vote on March 31, 2004 and filed report H. Rept. 108–465 on April 20, 2004. The House agreed to suspend the rules and pass H.R. 4030, as amended, by: Y–411; N–7; Roll Call No. 122 on April 21, 2004. On April 22, 2004, the measure was received in the Senate and referred to the Committee on Health, Education, Labor, and Pensions.

2.19—H.R. 4218, HIGH-PERFORMANCE COMPUTING REVITALIZATION ACT OF 2004

Background and Summary of Legislation

High-performance computing—also called supercomputing, high-end computing, and sometimes advanced scientific computing—refers to the use of machines or groups of machines that can perform very complex computations very quickly. High-performance computers are, by definition, the most powerful computers in the world at a given moment in time. They are used to solve highly complex scientific and engineering problems, to simulate physical systems that are often difficult to study experimentally, or to manage vast amounts of data.

The Federal Government promotes high-performance computing in several different ways. First, it funds research and development (R&D) at universities, government laboratories and companies to help develop new computer hardware and software; second, it funds the purchase of high-performance computers for universities and government laboratories; and third, it provides access to high-performance computers for a wide variety of researchers by allowing them to use government-supported computers at universities and government labs.

In recent years, federally-supported efforts appear to have lost momentum as the focus of computing activities began shifting from high-performance computing to less specialized computing and net-

working technologies. For example, while the National Science Foundation is committed to providing access to the fastest computers through supercomputer centers, it has also said it will place greater emphasis on distributed collections of many computers (known as "grid computing"), which may not provide computing capability equal to that of the fastest supercomputers.

Responding to concerns that U.S. efforts to develop and deploy high-performance computers may have lagged, in 2003 the Office of Science and Technology Policy (OSTP) created an interagency task force—the High-End Computing Revitalization Task Force (HEC–RTF)—to examine federal high-performance computing programs and make recommendations for improvement. Their report is entitled the *Federal Plan for High-End Computing*.

H.R. 4218 would update the *High-Performance Computing Act of 1991* and focus federal computing efforts to reverse the trend of the diminishing dominance of the U.S. in high-end computing. The bill requires the High-Performance Computing R&D Program, and specifically, NSF and the Department of Energy Office of Science, to assure the U.S. research community sustained access to world-class high-performance computing systems for solving scientific and engineering problems. The bill also requires the program to support all aspects of high-performance computing for scientific and engineering applications, including software, algorithm and applications development, development of technical standards, development of new computer models for science and engineering problem solving, and education and training in all the disciplines that support advanced computing.

The bill requires the Director of OSTP to "develop and maintain a research, development, and deployment roadmap for the provision of high-performance computing systems for use by the research community in the United States." This and other provisions in the bill are designed to ensure a robust ongoing planning and coordination process so that the national high-performance computing effort remains at the leading edge of supercomputing technologies.

Legislative History

H.R. 4218 was introduced by Subcommittee on Energy Chairwoman Judy Biggert on April 27, 2004, and was solely referred to the Committee on Science. The Committee held a hearing on the measure on May 13, 2004 and a markup on June 16, 2004, at which it ordered the measure reported, without amendment, by a voice vote. The Committee filed report H. Rept. 108–580 on July 1, 2004. On July 7, 2004, the House agreed to suspend the rules and pass H.R. 4218, as amended, by a voice vote. The measure was received in the Senate on July 8, 2004 and referred to the Committee on Commerce, Science, and Transportation.

2.20—H.R. 4546, National Oceanic and Atmospheric Administration Act

Background and Summary of Legislation

The National Oceanic and Atmospheric Administration (NOAA) was established by Executive Order in 1970. At that time Execu-

tive Reorganization Plans had the effect of law. Since then, various parts of NOAA have been authorized by Congress, but there is no underlying "organic act" defining the mission and function of the agency.

The Oceans Act of 2000 established the U.S. Commission on Ocean Policy to examine the Nation's ocean policy and make recommendations for improvements. On April 20, 2004 the Commission released its preliminary report, which included 200 recommendations for an improved national ocean policy. One of the recommendations is that Congress should pass an organic act for NOAA. The Commission also suggested organizing NOAA's functions around specific themes rather than the current line office structure.

H.R.4546 incorporates these recommendations in Title I as a general organic act and by outlining NOAA's missions and functions under three categories: weather, operations and services, and research and education. The bill as introduced does not include NOAA's activities concerning fisheries management or the *Coastal Zone Management Act.*

Currently NOAA has a structure of six line offices: the National Ocean Service (NOS), the National Marine Fisheries Service (NMFS), the National Weather Service (NWS), the National Environmental Satellite Data and Information Service (NESDIS), the Office of Oceanic and Atmospheric Research (OAR), and the Office of Program Planning and Integration (PPI). H.R. 4546 provides NOAA the flexibility to perform the functions described in the bill under the current organizational structure or by moving towards a structure that reflects the categories set forth in H.R. 4546.

Legislative History

H.R. 4546 was introduced by Chairman Vernon Ehlers on June 14, 2003, and referred to the Committee on Science and, additionally, to the Committee on Resources. The Subcommittee on Environment, Technology, and Standards of the House Science Committee met to consider H.R. 4546 on September 29, 2004. An amendment in the nature of a substitute was passed and the measure was ordered to be reported as amended to the Full Committee.

Chapter III—Commemorative Resolutions Discharged by the Committee on Science and Passed by the House of Representatives

3.1—H.CON.RES. 189, CELEBRATING THE 50TH ANNIVERSARY OF THE INTERNATIONAL GEOPHYSICAL YEAR (IGY) AND SUPPORTING AN INTERNATIONAL GEOPHYSICAL YEAR-2 (IGY–2) IN 2007–2008

Background and Summary of the Legislation

This resolution celebrates the 50th anniversary of the first International Geophysical Year (IGY) held in 1957–1958 which was an internationally coordinated effort to observe and collect data about earth science. More than 60,000 scientists from 67 countries participated in this event. H.Con.Res. 189 endorses the idea of a second IGY.

Legislative History

H.Con.Res. 189, was introduced by Representative Udall of Colorado on May 21, 2003 and solely referred to the Committee on Science. The Committee ordered the measure reported, as amended, by a voice vote on February 4, 2004 and filed H.Rept. 108–422 on February 18, 2004. The House agreed to suspend the rules and pass H.Con.Res. 189 by: Y–420; N–3; Roll Call No. 83 on March 24, 2004. It was received in the Senate and referred to the Senate Committee on Commerce, Science, and Transportation on March 25, 2004.

3.2—H.CON.RES. 279, 30TH ANNIVERSARY OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE CONGRESSIONAL SCIENCE AND ENGINEERING FELLOWSHIP PROGRAM

Background and Summary of the Legislation

This resolution recognizes a valuable educational program that gives scientists an opportunity to step out of the laboratory and into the political process by working as legislative assistants in Member offices and congressional committees. Over 800 scientists have participated in this program and contributed not only their scientific expertise, but also a fresh perspective to policy-making.

Legislative History

H.Con.Res. 279 was introduced by Representative Ehlers of Michigan on September 15, 2003 and solely referred to the Committee on Science. The Committee ordered the measure reported, without amendment, on October 16, 2003 by a voice vote. On October 28, 2003, the House agreed to suspend the rules and pass H.Con.Res. 279, without amendment, by a voice vote. It was received in the Senate on October 29, 2003 and referred to the Senate Committee on Judiciary.

3.3—H.CON.RES. 301, SUPPORTING THE GOALS AND IDEALS OF THE WORLD YEAR OF PHYSICS

Background and Summary of the Legislation

This resolution supports the goals and ideals of the World Year of Physics and at the same time celebrates the 100th anniversary of Einstein's development of the theory of relativity. It recognizes the important contributions of physicists to technological progress and the health of many industries.

Legislative History

H.Con.Res. 301 was introduced by Representative Ehlers of Michigan on October 15, 2003 and solely referred to the Committee on Science. On July 7, 2004, the Committee discharged the resolution and the House agreed to suspend the rules and pass H.Con.Res. 301, without amendment, by a voice vote. It was received in the Senate on July 8, 2004 and finally referred to the Senate Committee on Commerce, Science, and Transportation on September 7, 2004.

3.4—H.CON.RES. 488, COMMENDING NOAA AND ITS EMPLOYEES FOR ITS DEDICATION AND HARD WORK DURING HURRICANES CHARLEY, FRANCES, AND IVAN

Background and Summary of the Legislation

This resolution recognizes the dedication and long hours of service rendered by the employees of the National Oceanic and Atmospheric Administration during the hurricane season of 2004.

Legislative History

H.Con.Res. 488 was introduced on September 9, 2004 and solely referred to the Committee on Science. On September 22, 2004, the Committee discharged the resolution and the House agreed to suspend the rules and pass H.Con.Res. 488, as amended, by a voice vote. It was received in the Senate and referred to the Senate Committee on Commerce, Science and Transportation on September 23, 2004.

3.5—H.RES. 222, COMMENDING THOSE INDIVIDUALS WHO CONTRIBUTED TO THE DEBRIS COLLECTION EFFORT FOLLOWING THE SPACE SHUTTLE *Columbia* accident

Background and Summary of the Legislation

This resolution honors the search teams of NASA, Department of Homeland Security, FEMA, EPA, FBI, DOD, DOT, U.S. Forest Service, Park Service, Texas National Guard, Louisiana National Guard, fire crews from 42 states, State and local authorities, as well as many farmers, land owners, and citizens who assisted in the recovery of nearly 85,000 pounds of debris, from the Space Shuttle *Columbia* accident. Recovery of this debris has been invaluable to the *Columbia* Accident Investigation Board in their efforts to determine the cause of the accident.

Legislative History

H.Res. 222 was introduced on May 7, 2003 by Representative Hall of Texas and solely referred to the Committee on Science. On May 13, 2003, the Committee discharged the measure and the House agreed to suspend the rules and pass H.Res. 222, without amendment, by: Y–411; N–0; Roll Call No. 185.

3.6—H.RES. 395, RECOGNIZING THE IMPORTANCE OF CHEMISTRY TO OUR EVERYDAY LIVES AND SUPPORTING THE GOALS AND IDEALS OF NATIONAL CHEMISTRY WEEK

Background and Summary of the Legislation

This resolution recognizes the contributions of chemical scientists and engineers to the technological progress and the health of many industries that deliver the foods, fuels, medicine and materials that are part of our every day lives.

Legislative History

H.Res. 395 was introduced on October 10, 2003 by Representative Holt of New Jersey and solely referred to the Committee on Science. The Committee ordered the measure reported, without amendment, by a voice vote on October 16, 2003. The House agreed to suspend the rules and pass H.Res. 395, without amendment, by a voice vote on October 28, 2003.

3.7—H.RES. 490, COMMENDING THE ACHIEVEMENTS OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, THE JET PROPULSION LABORATORY, AND CORNELL UNIVERSITY IN CONDUCTING THE MARS EXPLORATION ROVER MISSION

Background and Summary of the Legislation

This resolution congratulates the Mars Exploration Rover team—NASA, JPL, and Cornell University—for their success in landing the Spirit Rover on Mars on January 3, 2004.

Legislative History

H.Res. 490 was introduced by Mr. Dreier of California on January 20, 2004 and solely referred to the Committee on Science. On January 21, 2004, the Committee discharged the measure and the House agreed to suspend the rules and H.Res. 490, without amendment, by: Y–389; N–0; Roll Call No. 4.

3.8—H.RES. 507, EXPRESSING PROFOUND SORROW OF THE HOUSE OF REPRESENTATIVES ON THE ANNIVERSARY OF THE SPACE SHUTTLE *Columbia* accident

Background and Summary of the Legislation

This resolution acknowledges the one-year anniversary of the Space Shuttle *Columbia* accident.

Legislative History

H.Res. 507 was introduced by Mr. Burgess of Texas on January 28, 2004 and solely referred to the Committee on Science. On February 3, 2004, the Committee discharged the measure and the

House agreed to suspend the rules and pass H.Res. 507, without amendment, by: Y–397; N–0; Roll Call No. 12.

3.9—H.RES. 723, RECOGNIZING THE 35TH ANNIVERSARY OF THE APOLLO 11 LUNAR LANDING

Background and Summary of the Legislation

This resolution honors the 35th Anniversary of the Apollo 11 Lunar Landing by astronauts Neil Armstrong, Buzz Aldrin, and Michael Collins.

Legislative History

H.Res. 723 was introduced by Representative Hall of Texas on July 19, 2004 and solely referred to the Committee on Science. On July 20, 2004, the Committee discharged the measure and the House began a lengthy debate on the resolution. On July 21, 2004, the motion offered by Mr. Hall to suspend the rules and agree to H.Res. 723 passed by: Y–416; N–0; Roll Call No. 402.

3.10—H.RES. 820, TO CONGRATULATE MOJAVE AEROSPACE VENTURES FOR WINNING THE PRIVATELY FUNDED $10,000,000 ANSARI X–PRIZE AND COMMEND THE X–PRIZE FOUNDATION FOR SPURRING THIS ACHIEVEMENT

Background and Summary of the Legislation

This resolution acknowledges Mojave Aerospace Ventures for capturing the Ansari X–Prize on October 4, 2004. This marks the first privately-funded investment effort to successfully enter outer space without federal funding.

Legislative History

H.Res. 820 was introduced by Representative Rohrabacher of California and solely referred to the Committee on Science on October 5, 2004. The Committee discharged the resolution on October 7, 2004 and the House agreed to suspend the rules and pass H.Res. 820, as amended, by a voice vote.

3.11—H.RES. 847, HONORING THE LIFE OF ASTRONAUT LEROY GORDON COOPER, JR.

Background and Summary of the Legislation

This resolution acknowledges the achievements of Leroy Gordon Cooper, Jr. who passed away at his home in Ventura, California on October 4, 2004.

Legislative History

H.Res. 847 was introduced by Mr. Ballenger of North Carolina and solely referred to the Committee on Science on October 8, 2004. The Committee discharged the resolution on November 19, 2004 and the House agreed to suspend the rules and pass H.Res. 847, without amendment, by a voice vote.

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)—Overview of the Federal R&D Budget for Fiscal Year 2004

February 13, 2003

Hearing Volume No. 108–1

Background

On February 13, 2003, the House Science Committee held a hearing to consider President Bush's fiscal year 2004 (FY04) budget request for research and development. Four Administration witnesses reviewed the proposed budget in the context of the President's overall priorities in science and technology. The Science Committee held a separate hearing on February 27 on the budget request for the National Aeronautics and Space Administration. The Subcommittee on Environment, Technology, and Standards held a hearing later in the year on the budget request for research and development at the Environmental Protection Agency.

The witnesses were: (1) John H. Marburger, III, Science Advisor to the President; Director, Office of Science and Technology Policy; (2) Samuel W. Bodman, Deputy Secretary, U.S. Department of Commerce; (3) Rita R. Colwell, Director, National Science Foundation; and (4) Robert G. Card, Under Secretary for Energy, Science, and Environment, U.S. Department of Energy.

Summary of Hearing

Dr. Marburger summarized a few of the highlights of the President's FY04 budget request during his testimony. He stated that the Administration received advice from the President's Council of Advisors on Science and Technology, the committees of the National Science and Technology Council, and the House Science Committee while preparing this budget. The budget includes a record high level of support for federal research and development (R&D). Compared to the FY03 request, the FY04 request represents a $123 billion, or seven percent, increase in federal R&D. Some of the specific programs highlighted include (all increases use the FY03 request as a baseline):

- The National Science Foundation (NSF) receives a $453 million (9 percent) increase. In particular, funding for physical science at NSF increases by $100 million (13 percent), and

graduate stipends increase by $5000 per year with the number of stipends awarded increasing as well.

- The Department of Energy's budget is increased by three percent to $5.2 billion. Construction funds for the Spallation Neutron Source are reduced and redirected towards R&D. When this is factored in, the Office of Science budget increases by $140.5 million (4.6 percent).
- The new Department of Homeland security will have R&D responsibilities for developing chemical, biological, radiological, and nuclear countermeasures. The FY04 request includes $803 million for these activities with another $3.2 billion spread over many agencies for R&D directed at combating terrorism.
- Significant investment in pre-K–12 math and science education is included in the FY04 request with an emphasis on evidence-based educational programs as called for in the No Child Left Behind Act of 2002.

Dr. Bodman testified on the R&D in the Department of Commerce budget request, whose Technology Administration, including the National Institute of Standards and Technology (NIST), and National Oceanic and Atmospheric Administration (NOAA) fall under the Science Committee's jurisdiction. He testified that the Commerce Department has redirected its spending to reflect four key priorities: (1) foster the Nation's economic growth; (2) secure the homeland; (3) upgrade facilities; and (4) implement the Administration's Climate Change Research Initiative (CCRI). He added:

- NOAA receives $3.3 billion, a $190 million (6 percent) increase. These funds will allow NOAA to advance understanding of marine and atmospheric resources. The FY04 request includes $65 million, a $7.7 million increase, for homeland security efforts, including upgrading the NOAA weather operation to an all-hazards warning network.
- One of the highlights of NOAA's work is in climate research. Climate research funding is increased from $17 million to $296 million and includes funding for the U.S. Global Climate Research Program and the Climate Change Research Initiative.
- The Technology Administration receives $505 million with $497 million going to NIST and the rest going to the Office of Technology Policy. This funding reflects a focus on NIST's core mission rather than on extramural programs like the Advanced Technology Program or the Manufacturing Extension Program.

Dr. Colwell testified that NSF is requesting $5.48 billion for FY04, a $453 million (9 percent) increase over last year's request. Ninety-five percent of this money goes directly to research and education activities. She also emphasized that NSF's priorities are determined through continuous consultation with the research and education communities. She added:

- The Math and Science Partnership Program, the centerpiece of the No Child Left Behind initiative, receives $200 million,

$4 million goes to the Noyce Scholarship Program, and graduate stipends are raised to $30,000 per year.
- The physical sciences will receive a 12.7 percent increase to bring the total physical sciences funding to over $1 billion.
- NSF has budgeted $303 million for information technology research, $249 million for the National Nanotechnology Initiative, and $100 million for biocomplexity in the environment.
- The budget for major research equipment and facilities construction projects gets the largest dollar increase. Its budget is increased by $219 million to $1.3 billion.

Mr. Card highlighted three areas that directed the Department of Energy's (DOE) thinking when coming up with their FY04 budget request. They were:

- DOE's energy strategies for generation of carbon-free electricity through hydrogen. The two initiatives supported are President Bush's hydrogen initiative, including FreedomCAR, and an expanded carbon sequestration initiative.
- DOE's management of spent nuclear fuel and high-level waste. Programs supported include the Environmental Management Accelerated Cleanup Program, the Nuclear Energy Fuel Cycle Programs, and the Yucca Mountain Repository Program.
- DOE is placing a growing emphasis on nanotechnology, computation, and genomics. These technologies underpin all departmental initiatives.
- To support these initiatives, DOE has aggressively implemented the President's Management Agenda to streamline management, intensify project oversight, and improve e-government programs.

4.1(b)—NASA's Fiscal Year 2004 Budget Request

February 27, 2003

Hearing Volume No. 108–3

Background

On February 27, 2003, the Science Committee held a Full Committee hearing on NASA's FY 2004 budget request. The hearing examined NASA's plans and programs and the rationale for the funding levels in the agency's FY 2004 budget. The committee received testimony from the Honorable Sean O'Keefe, NASA Administrator.

The hearing's intent was not to review the status of the then ongoing investigation into the *Columbia* accident, but, in addition to examining the FY 2004 budget request, was to examine how the grounding of the Space Shuttle fleet would affect other programs.

Summary of Hearing

Member's focused their line of questioning, not on the Space Shuttle *Columbia* Accident, but on the FY 2004 budget request and

it's impact on existing programs, as well as how NASA planned on addressing the grounding of the Space Shuttle fleet.

Administrator O'Keefe took the opportunity to announce the start of Project Prometheus, a major initiative (three billion dollars over the next five years) within NASA to develop and demonstrate nuclear power and propulsion systems, as well as NASA's move to Full Cost Accounting.

Member's questioned the agency's proposed decrease in funding for Aeronautics Research and Development by 4.5 percent over the next five years. Members cited the recently released Aerospace Commission Report, chaired by former Science Committee Chairman Robert Walker, as evidence of a need for continued investment in this area.

Additional areas of focus were the zeroing out of programs such as the Rotorcraft Research and Development, and the Alternate Access to Station Programs. Clarification was provided to the Committee that illustrated that the Rotorcraft Research and Development Program Budget line was deleted, but the funding was continuing through another budget line. However, the Alternate Access to Station Program was indeed zeroed out, with the only remaining activity being conducted in the form of a study funded with FY03 funds.

When describing the investigation that was to follow, Chairman Boehlert stated, "I hope our investigation will be more about fixing problems than fixing blame—although determining accountability obviously is important. But beyond such immediate concerns, I hope we will address the harder question about whether the benefits outweigh the risks when we send people into space at this time and in the current fashion when unmanned missions can almost entirely match the quality of human participation."

4.1(c)—The Path to a Hydrogen Economy

March 5, 2003

Hearing Volume No. 108–4

Background

In his 2003 State of the Union speech, President Bush announced the creation of a new Hydrogen Initiative—a $1.2 billion, five-year research and development program to develop the technology and the hydrogen infrastructure for vehicles whose only emissions would be water vapor. The Hydrogen Initiative would build on FreedomCAR, a $500 million research program announced last year by the Administration to develop fuel cell powered vehicles. Both programs would be operated by the Department of Energy (DOE). The Committee held the hearing in order to answer three broad questions:

1) What are the greatest hurdles the country will face in converting to a hydrogen economy? To what extent is a federal effort needed to clear the way?
2) What specific and comprehensive goals are needed for the Hydrogen Initiative to ensure the fastest possible development and widespread utilization of hydrogen?

3) Will technology research alone lead to a transition to hydrogen, or will it be necessary to apply policy tools? How should a research and development effort take these policy choices into account?

Summary of Hearing

Members heard from the following witnesses about what the hydrogen economy might look like, and what it will take to get there: David Garman, Assistant Secretary for Energy Efficiency and Renewable Energy, Department of Energy, Alan C. Lloyd, Ph.D., 2003 Chairman, California Fuel Cell Partnership, Joan Ogden, Ph.D., Research Scientist, Princeton Environmental Institute, Dr. Larry Burns, Vice President, Research, Development and Planning, General Motors and Don Huberts, Chief Executive Officer, Shell Hydrogen. The witnesses were optimistic about the possibilities of hydrogen, although they did not expect widespread adoption of hydrogen vehicles for at least two or three decades. Several technical challenges were outlined, although the witnesses were confident that they could be overcome.

David Garman testified that the Hydrogen Initiative would not harm the renewable and energy efficiency research already taking place at DOE, and that the Hydrogen Initiative would focus on renewably-produced hydrogen. Dr. Ogden testified that using natural gas to produce hydrogen would not significantly reduce the availability of natural gas for other uses. In response to questioning, Mr. Huberts said that hydrogen would always be more expensive than more traditional fuels, and the environmental benefits of using hydrogen would have to be taken into account for widespread adoption to occur.

4.1(d)—The Aerospace Commission Report and NASA Workforce

March 12, 2003

Hearing Volume No. 108–7

Background

On March 12, 2003, the House Science Committee held a Full Committee hearing to review *The Final Report of the Commission on the Future of the United States Aerospace Industry* and NASA Workforce legislation. The hearing consisted of two panels. The first panel reviewed the Aerospace Commission report issued last November to the President and Congress. The second panel reviewed the proposed legislation, H.R. 1085, the *NASA Flexibility Act of 2003*. This bill provides additional authorities for the agency to recruit and retain a highly-skilled workforce which was one of the primary recommendations from the Aerospace Commission.

The first panel one focused on the Aerospace Commission report and featured the Honorable Bob Walker, Chairman, Aerospace Commission, as well as President, Wexler Walker Public Policy Associates; The Honorable John Douglass, Commissioner, as well as President, Aerospace Industries Association; and the Honorable John Hamre, Commissioner, as well as President, Center for Strategic and International Studies. The second panel focused on the

NASA Workforce legislation and featured Mr. Max Stier, President, Partnership for Public Service; Mr. Bobby Harnage, President, American Federation of Government Employees, and Mr. George Nesterczuk, Nesterczuk and Associates.

Summary of Hearing

Members heard sobering news on the growing problems facing the U.S. Aerospace industry, but received concrete recommendations on how to face these challenges. "The integral role aerospace plays in our economy, our security, our mobility, and our values make global leadership in aviation and space a national imperative," said Robert S. Walker, while presenting the Commission's *Final Report* to the Committee. "Given the real and evolving challenges that confront our nation, government must commit to increased and sustained investment and must facilitate private investment in our national aerospace sector." The *Final Report* consisted of nine, unanimous recommendations, including a call to "immediately reverse the decline in and promote the growth of a scientifically technologically trained U.S. aerospace workforce." Walker warned, "The breakdown of America's intellectual and industrial capacity is a threat to national security and our capability to continue as world leader."

Members also heard from Aerospace panel Commissioners John Douglass, President of Aerospace Industries Association and John Hamre, President of Center for Strategic and International Studies who provided specific recommendations for how the U.S. should proceed in righting the course for the American Aerospace Industry. In particular, Mr. Hamre suggested that current export controls in the aerospace sector should be re-evaluated and updated to reflect the distinction between cutting edge technology and old, prosaic technology.

Expert witnesses expressed support for Chairman Boehlert's legislation to address the "brain drain" at NASA, calling it a "good step in the right direction." Boehlert's bill, H.R. 1085, the *NASA Workforce Flexibility Act of 2003* gives NASA more flexibility to recruit and retain a highly skilled workforce.

"Within five years, a quarter of the NASA workforce will be eligible to retire. The most recent General Accounting Office (GAO) report on NASA, issued just this past January, noted, 'The agency still need[s] to deal with critical losses due to retirements in coming years,'" said Boehlert. "I've introduced H.R. 1085 to help NASA deal with this enormous challenge." Mr. Stier supported Chairman Boehlert's approach and offered suggestions for some changes to the legislation. Mr. Nesterczuk stated, "Broadly speaking, I support the intent of H.R. 1085 and believe its provisions will indeed provide NASA much needed flexibility in dealing with some vexing human resource issues."

Prior to the hearing, Chairman Boehlert received a letter in support for his bill, with some suggested changes, from Dr. Lee Stone, Vice President, Legislative Affairs for the Ames Federal Employees Union, the International Federation of Professional & Technical Engineers (IFTPE) Local 30. Dr. Stier's letter stated, "We applaud your efforts to address NASA's problem of attracting and retaining the next generation of highly skilled, technical engineering and sci-

entific employees," said Dr. Stone. "We are pleased that your legislative proposal (H.R. 1085) focuses on reducing the pay inequities facing NASA science and engineering staff with respect to the private sector."

Mr. Harnage testified at the hearing that the American Federation of Government Employees (AFGE) "opposes most of the human resources proposals contained in [H.R. 1085]" and "strongly opposes the implied policy of seeking changes to civil service laws on an agency-by-agency basis." Mr. Stier argued against this approach of waiting for government-wide civil service changes: "As attractive as that proposition sounds on the surface, the realities of the situation argue against it for three reasons. First, NASA's needs are too acute to await a broader legislative package. Second, we believe NASA has demonstrated that it is presently ready to manage the proposed flexibilities in a responsible and effective manner. Third, while we support the broader goal of comprehensive government-wide reforms, we see no reason to delay action on the current proposals until that more ambitious agenda is realized."

"Given that people are our greatest resource, we must give top priority in cultivating creative and talented young people to fill the ranks of the aerospace workforce," said Space and Aeronautics Subcommittee Chair Dana Rohrabacher (R–CA). "Legislation introduced by Chairman Boehlert offers NASA added support to effectively deal with this problem."

Democrats on the Committee expressed some concern with Chairman Boehlert's legislation. Ranking Democrat Ralph Hall (D–TX) said, "The NASA workforce is a family. As we seek to strengthen it, we need to ensure that whatever we do benefits all of the NASA employees, not just a favored few." Rep. Bart Gordon (D–TN), Ranking Member of the Space and Aeronautics Subcommittee added, "I believe we need a comprehensive and independent assessment of how well NASA is making use of existing human capital legislation before we contemplate adding more laws."

4.1(e)—H.R. 766, Nanotechnology Research and Development Act of 2003

March 19, 2003

Hearing Volume No. 108–6

Background

On March 19, 2003, the House Science Committee held a hearing to examine federal nanotechnology research and development (R&D) activities and to consider H.R. 766, the *Nanotechnology Research and Development Act of 2003,* which would authorize these programs.

The Subcommittee heard testimony from two panels of witnesses. Panel 1: (1) Honorable George Allen, Senator from Virginia; and (2) Honorable Ron Wyden, Senator from Oregon. Panel 2: (1) Mr. Richard M. Russell, Associate Director for Technology, Office of Science and Technology Policy; (2) Dr. Thomas N. Theis, Director of Physical Sciences, IBM Research Division, Thomas J. Watson Research Center; (3) Dr. James Roberto, Associate Laboratory Director for Physical Sciences, Oak Ridge National Laboratory; (4) Dr. Carl A.

Batt, Co-Director of the Nanobiotechnology Center, Cornell University; and (5) Mr. Alan Marty, Executive-in-Residence, JP Morgan Partners.

Summary of Hearing

Chairman Boehlert opened the hearing by noting the broad consensus that exists throughout the Congress and nationwide about the importance and promise of nanotechnology. He also listed the three main thrusts of H.R. 766, which are to encourage interdisciplinary research, improve interagency coordination, and increase research into societal consequences. Mr. Hall added that the scope of nanotechnology is so wide that it will leave virtually no product untouched.

Senator Wyden testified first. He began his testimony by hinting at the possibilities nanotechnology holds for the health care field and cautioned that we must be thoughtful before rushing to develop programs for nanotechnology. He also stressed the need to coordinate nanotechnology programs across the Federal Government. Other nations are aggressively pursing nanotechnology so, to remain competitive, the U.S. should as well.

Senator Allen testified that he believes that many nations like Japan, Korea, China, and some members of the European Union are pulling ahead of the U.S. in applying nanoscience research and development results. It is important for health care, for communications, for commerce, for manufacturing, for aeronautics, and indeed for our national security that the United States is a leader in this nanotechnology revolution. Members of Congress must educate themselves about this key area.

Mr. Russell's testimony dealt with the National Nanotechnology Initiative (NNI), how it is organized within the government, and how it relates to nanotechnology research and development (R&D).

- The NNI is an interagency program that provides basic research funding to colleges, universities, and the national labs. It has received strong support from the Administration, and $849 million is proposed for the NNI in the President's FY04 budget request. That is an increase of 10 percent over the FY03 request.
- NNI funding will support research activities directed at certain "grand challenges," such as innovations in manufacturing, energy production and storage, medicine, and homeland security.
- The Nanoscale Science and Engineering Technology (NSET) Subcommittee of the National Science and Technology Council coordinates the NNI. The Subcommittee is composed of NNI agency representatives, the Office of Science and Technology Policy (OSTP), and the Office of Management and Budget (OMB). OSTP is trying to elevate the visibility of nanotechnology and increase coordination and priority setting.
- The President's Council of Advisors on Science and Technology (PCAST) will review the NNI and advise the President on how to improve the program.

Dr. Theis reported to the Committee on the status of IBM's research efforts in nanotechnology. IBM has tremendous interest in nanotechnology because it is the key to the future of information technology. It will allow manufacturers to continue a rapid pace of improvements in the speed, cost, and energy efficiency of hardware. Also, being able to design materials with atomic precision allows for unprecedented control over the electronic, magnetic, optical, and thermal properties of materials. In addition, Dr. Theis was a part of the National Academy of Sciences review of the NNI and listed the recommendations of the review. They are:

- The Federal Government should increase interagency coordination and ensure the long-term stability of the federal nanotechnology effort.
- The OSTP should establish an independent advisory board to identify research opportunities.
- Research into the societal implications of nanotechnology should be an integral part of the NNI.
- The NNI should support funding for basic research on nanoscale science and technology.

Dr. Roberto testified that H.R. 766 is an important part of the strategy to strengthen the physical sciences in the United States, and stated that advances in the physical sciences have a direct effect on economic growth, new medical technology, energy independence, and enhanced national security. He feels that we will see a paradigm shift in the physical sciences to rival that seen in the biological sciences after the discovery of the structure of DNA. Dr. Roberto emphasized that the excitement about nanotechnology is real and that this new field will cross the boundaries of almost every science and engineering discipline.

During his testimony Dr. Batt described some recent research activities and advances in nanobiotechnology. Most biology occurs at the nanometer scale and nanotechnology will provide the tools necessary to truly study and understand phenomena at this scale. Some of the current efforts in this vein are projects to more efficiently sequence DNA, understand how proteins fold, develop biofabrication methods to replace the current ways of producing computer chips, and develop hand-held sensors that can detect foodborn pathogens and biowarfare agents. Dr. Batt believes that the key to success is in interdisciplinary efforts. Dr. Batt also described his outreach efforts and how he spends about one third of his time explaining nanotechnology to "little kids" (elementary and middle school students).

Mr. Marty's testimony focused on the transition of nanotechnology from the lab to the marketplace. The National Science Foundation predicts a $1 trillion global market for nanotechnology in just over a decade. Mr. Marty believes that H.R. 766 is the beginning of an essential dialogue with the public that is necessary to support this burgeoning market. Before a venture firm will fund a start-up business, it must show sufficient progress towards commercialization so as to ensure a positive return for the venture firm. To get from the laboratory to that point will require some federal support, and this is where, historically, federal funds have been lacking in the U.S. Some foreign governments are enthu-

siastically supporting this phase of technology transfer in their countries and hence these foreign companies may gain a competitive edge on U.S. industry. Mr. Marty also testified that the Nanobusiness Alliance supports the Act but would like to see local government officials, economic development experts, and ethicists added to the advisory board.

4.1(f)—Dealing With Foreign Students and Scholars in an Age of Terrorism: Visa Backlogs and Tracking Systems

March 26, 2003

Hearing Volume No. 108–9

Background

On March 26, 2003, the House Science Committee held a hearing on the enhanced security measures that foreign students and scholars in science, mathematics and engineering face when they apply for a visa and subsequently enroll in an academic or exchange program in the U.S. This hearing is the second in a series on the need for balance between heightened security and scientific openness in the post-September 11 environment and it will explore the development and implementation of enhanced visa adjudication and monitoring systems and their impact on individuals, universities and research collaborations.

The witnesses were: (1) Ms. Janice L. Jacobs, Deputy Assistant Secretary, Visa Services; (2) Dr. David Ward, President, American Council on Education; and (3) Dr. Shirley M. Tilghman, President, Princeton University.

Summary of Hearing

Ms. Jacobs testified that issuing visas has always been about striking the right balance between protecting U.S. borders and facilitating legitimate travel. This balance was forever altered on September 11, 2001 and several changes have been made since then in response. Security, however, is the top priority. Ms. Jacobs went on to outline some of the aspects of the visa-granting program, including:

- The U.S. vets all visa applications with law enforcement agencies, the intelligence community, and the Nonproliferation Bureau before granting any visas.
- There are two reasons the visa-granting process has slowed since 9/11. One, the number of visas that need security advisory opinion clearances has increased dramatically, and two, the practice of granting a visa after a certain period of time has elapsed, regardless of whether approval has been granted, has stopped.
- Given the post-9/11 environment, there will not be a return to expeditious visa processing. Visa Services will not advise consular offices to grant visas, regardless of the sense of urgency, as long as an agency has an objection to a particular case. However, for cases where no objections are raised, clearances can be granted in 30 days or less.

Dr. Ward stated that there is broad agreement both on the value of international exchange of students and scholars and on the necessity for a secure visa granting process; the discussion is centered on striking the right balance to make it work. He went on to describe some of the concerns the American Council on Education (ACE) has with the current visa system.

- The Student Exchange Visitor Information System (SEVIS) is the most important step the Federal Government has taken to improve its handling of foreign students and scholars, but ACE is concerned that SEVIS is being implemented before being fully tested. What's more, campus administrators and even some Immigration and Naturalization Service personnel have not been adequately trained in its use. ACE believes that the Department of State has not put appropriate emphasis on fixing the problems associated with SEVIS.
- Some technical flaws associated with SEVIS include frequent data losses, forms being printed out at other schools, sometimes hundreds of miles away, batch processing that only works intermittently, and incomplete access for all students.
- ACE expects there to be delays in the new visa process but is concerned that so many are unpredictable delays. ACE would like a visa process that is timely, though will certainly take more time than before, but predictable. They would also like current visa holders to be able to revalidate their visas before leaving the U.S. for academic, health, or other sensible, personal reasons.

Dr. Tilghman testified that the events of September 11, 2001 made the academic community aware of the need to consider the national security implications of their work, and she believes that they have been responsive to these concerns. She agreed with the other witnesses that there is a need to balance national security with scientific openness, then went on to describe some of her concerns with the current visa process.

- Dr. Tilghman is concerned that if security measures become too restrictive the U.S. will become unable to attract the best foreign students. The success of the U.S. as a leader in international science and technology is dependent on attracting the best students from all over the world.
- The guidelines that consular offices operate under virtually guarantee that any student interested in science or engineering will experience delays in the visa process. Consular offices are instructed to look for certain words or phrases that might raise a flag on a visa application. Many students, especially students in the biological sciences, are certain to use some of these key words even if their work is non-threatening.
- Dr. Tilghman agreed that there should be a pre-certification program that would allow students to leave the country temporarily knowing that they will be able to return in a prompt and effective manner.

- Dr. Tilghman believes that the new IPASS system could solve many of the existing problems but could also hinder the process just by adding another layer of review. It is still difficult to evaluate the utility of IPASS because little is currently known about it.

4.1(g)—The Societal Implications of Nanotechnology

April 9, 2003

Hearing Volume No. 108–13

Background

On April 9, 2003, the House Science Committee held a hearing to examine the societal implications of nanotechnology and to consider H.R. 766, the *Nanotechnology Research and Development Act of 2003,* in light of those implications.

The witnesses were: (1) Mr. Raymond Kurzweil, Chairman and CEO, Kurzweil Technologies, Inc.; (2) Dr. Vicki L. Colvin, Executive Director, Center for Biological and Environmental Nanotechnology; Associate Professor of Chemistry, Rice University; (3) Dr. Langdon Winner, Professor of Political Science, Department of Science and Technology Studies, Rensselaer Polytechnic Institute; and (4) Ms. Christine Peterson, President, Foresight Institute.

Summary of Hearing

Mr. Kurzweil testified that society will eventually see both great promise and some peril from nanotechnology, and was confident that with the right strategies, the peril can be managed. He believes that nanotechnology will affect nearly every sector of society, including health, medicine, manufacturing, electronics, computers, energy, travel, and defense. In addition, he testified that:

- Based upon his mathematical models of technological evolution, much of technology will become nanotechnology by the 2020's. He foresees this "golden age" of nanotechnology as enabling us to find solutions to pollution, poverty, disease, and aging.
- There is both a moral and economic imperative for continuing the pursuit of nanotechnology. The moral imperative is that, although technology has vastly improved our quality of life, there is still much suffering in the world and many problems for which nanotechnology might be a solution. The economic imperative is that since nanotechnology is so pervasive in all fields of technology, giving up pursuit of it would mean relinquishing pursuit of all technology. There is also the fear that giving up pursuit of nanotechnology would only push it underground where the dangers become even more extreme.
- Those with fears about the dangers of nanotechnology can be comforted by how the threats posed by computer viruses, a non-biological, self-replicating, recent technological innovation, have been mitigated. No one would suggest giving up the Internet because of these viruses, and this was done in

an industry without regulation or certification for practitioners.

Dr. Colvin testified about her concern for the public relations problems that will arise if nanotechnology continues to be misrepresented to the public and studies are not done on the environmental and health impacts of nanotechnology. She warned that public fear of the new technology could bring the industry to its knees. However, she feels that there is still time to ensure the responsible development of nanotechnology, and believes that H.R. 766 will play a large part in garnering strong public support. She added:

- Legislative help is needed because very little money or interest is given to research into the societal and environmental implications of nanotechnology. This is because researchers and funding agencies are more concerned about uncovering the positive effects of their research, not their negative effects. Legislation could demonstrate that Congress feels that research on societal and environmental consequences is important.
- To adequately study the implications of nanotechnology, we will need both nanotechnologists to foresee the technology development and social and environmental scientists to evaluate the consequences of these developments. A collaborative effort such as this is best accomplished in a center environment.
- She mentioned the research on ethical, legal, and social implications within the Human Genome Project (HGP) as an example of how work on alleviating public fears can be an important part of a potentially controversial research program. As was proposed for the HGP, she suggested that the Federal Government should invest five percent of nanotechnology funding in studies of the societal, ethical, and environmental implications.

In his testimony, Dr. Winner warned the Committee not to make the same mistakes with nanotechnology that were made with biotechnology. Societal concerns about biotechnology, especially genetically modified foods, were ignored while the technology was being developed, leading to a technological backlash in many sectors of society. Dr. Winner explained that this was because those with the most to gain in the short run from a new technology usually speak up first and most loudly, while society at large begins to raise questions about the benefits and drawbacks only much later. He added:

- Broad-ranging, detailed, intellectually rigorous inquiries into the social and ethical concerns of nanotechnology need to be conducted by persons with no financial or institutional stakes in the outcome of the study. These studies can be accomplished in cross-disciplinary programs at universities and research centers; a cadre of "nanoethicists" does not need to be formed to address societal and ethical concerns.
- The public should be included in deliberations on nanotechnology early in the process through small, jury-like panels of disinterested citizens. They would be given rel-

evant documents, expert testimony from a variety of viewpoints on the applications and consequences of the new technology, and be asked to offer policy advice. The National Science Foundation is currently researching this type of citizen panel.

Ms. Peterson described two different types of nanotechnology. The first type is any technology that is significantly smaller than microtechnology; for example, nanoparticles, which are already possible. The second type involves the ability to work at the molecular level to create large structures with fundamentally new molecular organization. The impact of this second type of nanotechnology will be much greater in the long run. She added:

- Nanotechnology could, among other advantages, lead to major advances in medical and environmental applications. Because nanomanufacturing could, in principle, be very inexpensive, we may have the opportunity to make sustainable improvements in living standards.
- There are several drawbacks, however. This is a disruptive technology that could result in economic impacts like job transitions. Education programs will be needed to help people make the change. Also, intellectual property rights could impede advancement if the basic building blocks of the technology get overly patented.
- The most challenging problem is the deliberate abuse of the new technology. One way around this problem would be to have an open international R&D effort instead of developing the technology in secret.
- A provision for a basic feasibility review of molecular manufacturing, where the proponents and critics of the technology can make their technical case to a group of unbiased scientists, could be added to the legislation.

4.1(h)—Cyber Security Research and Development

May 14, 2003

Hearing Volume No. 108–17

Background

On May 14, 2003, the House Science Committee held a hearing to examine federal cyber security research and development (R&D) activities and implementation of last year's Cyber Security Research and Development Act (P.L. 107–305).

The witnesses were: (1) Dr. Charles E. McQueary, Under Secretary for Science and Technology, Department of Homeland Security (DHS); (2) Dr. Rita R. Colwell, Director, National Science Foundation (NSF); (3) Dr. Arden L. Bement, Jr., Director, National Institute of Standards and Technology (NIST), Technology Administration, U.S. Department of Commerce; and (4) Dr. Anthony J. Tether, Director, Defense Advanced Research Projects Agency (DARPA).

Summary of Hearing

Dr. McQueary testified that DHS requested $7 million for cyber security research in fiscal year 2004, but acknowledged he would be willing to revisit the funding allocation. He also presented the Science and Technology Directorate's plan to focus on cyber security threats and was confident that this plan would place sufficient emphasis on cyber security. In particular, he stated that:

- The Directorate's mission is to develop and deploy systems to detect and mitigate the consequences of a chemical, biological, radiological, nuclear, or cyber threat so that those who serve in the defense of the homeland have the tools necessary to effectively perform their duties.
- The Under Secretary for Information Analysis and Infrastructure Protection in DHS would have responsibility for carrying out the operational aspects of the Department's cyber security plan.
- As part of its efforts to counter the cyber threat, the Directorate will establish a cyber security R&D center and partner with NSF, NIST, and DARPA to leverage existing technologies and research in the military, academic, and industry sectors. One of the center's specific goals will be to use an existing or develop a new cyber test bed to safely and effectively test new cyber security approaches.
- The Directorate is working to coordinate efforts across the federal sector. For example, DHS representatives have participated in the INFOSEC Research Council, and the Directorate has many detailees from NIST, the Secret Service, NSF, and NSA.

Dr. Colwell agreed that not enough attention is being paid to the cyber security threat, and emphasized that we have to protect against attacks from outside, as well as inside, the U.S.

- The NSF has been funding cyber security research since 1978. A major computing research program was begun in 2001, and since then there has been a dramatic increase in the research community's interest in cyber security research.
- The NSF spent about $30 million on cyber security research in fiscal year 2003 and approximately $11 million on the cyber security Scholarships for Service Program. NSF is planning to convene a workshop to study workforce needs in cyber security and a meeting of cyber security principal investors to build connections within the research community.
- In order to encourage innovative approaches to cyber security and ensure the public trust, NSF feels it is important to have multidisciplinary research programs and effective public/private partnerships that guide the strategic development. The NSF is also convening summer workshops and meetings of principal investigators to facilitate interaction of multidisciplinary researchers.
- NSF is active in many interagency activities, and the Assistant Director for Computer and Information Science and En-

gineering chairs the Networking and Information Technology Research and Development Program working group.

Dr. Bement stated that some current security procedures (e.g., firewalls) do not cover all four R's of cyber security: recognize an attack, resist the attack, respond to the attack, and recover from the attack. Therefore, there is still much work to be done in developing cyber defenses. He added:

- The greatest current threat to the Nation's cyber security is indifference: ill-educated users, lack of cyber security experts, poorly designed systems and software, specific vulnerabilities in commercial information technology products, and a preponderance of commercial security products that are not sufficiently tested.
- NIST has published security guidelines for e-mail, firewalls, telecommuting and business systems contingency planning. These guidelines provide leadership to industry as well as government, and some go on to become American National Standards Institute (ANSI) and even international standards.
- Dr. Bement warned of the consequences due to the "ripple effect" of a cyber attack. The effects of an attack on a power grid, for example, could be felt by many industrial sectors and over a whole geographic area. NIST has been partnering with industry to provide grants for research on critical infrastructure protection.
- NIST also supports an emphasis on inter-agency cooperation. They are working on a Memorandum of Understanding with the S&T Directorate at DHS and continue to have successful relationships with NSF, OSTP, DARPA, and NSA.

Dr. Tether testified that the military is moving towards "network-centric warfare" where the organizations, weapons platforms, and people are networked together to quickly and effectively carry out operations. As a result, the network has now become a weapon itself and, therefore, must be protected like any other weapon from outside attack. He added:

- DARPA is currently idea-limited when it comes to cyber security, rather than short on funds. Its unclassified information security budget has decreased since 2002, but he hinted that that is due to more and more money being moved into the classified budget.
- Dr. Tether outlined the evolution of cyber security projects from firewalls to detecting and mitigating attacks to the current focus on being able to operate effectively even while an attack is taking place.
- DARPA is currently working to provide the Department of Defense with a peer-to-peer network that will reduce the need for infrastructure. This type of network will be more resilient to attack and will be able to assemble and reassemble on the fly. There is great commercial interest in this type of network; for example, technology in this area could be used

for cell phone networks in which each phone is a relay and fewer towers are required.

- Dr. Tether assured the Committee that while DARPA is putting more emphasis on military problems, the non-military world will see long-term benefits because of the broad applications of the technologies developed for military use.

4.1(i)—H.R. 1118, Staffing for Adequate Fire and Emergency Response Firefighters Act of 2003

June 4, 2003

Hearing Volume No. 108–15

Background

The purpose of the hearing was to review H.R. 1118, *Staffing for Adequate Fire and Emergency Response (SAFER) Act of 2003* and to provide recommendations to refine the bill. The purpose of this legislation is to help communities across America meet new minimum staffing standards for the fire services so they have adequate manpower to protect against fires, acts of terrorism, and other hazards. Witnesses from Members of Congress, national fire associations, and local fire department chiefs testified to the challenges faced by fire and emergency response agents and the necessity for adequate training and equipment. Witnesses discussed local and volunteer fire department preparedness and response capabilities in regards to fire services, threat of terrorism, and other emergency response.

The Committee heard testimony from (1) the Honorable Curt Weldon, Member, U.S. House of Representatives; (2) the Honorable Bill Pascrell, Member, U.S. House of Representatives; (3) the Honorable Christopher J. Dodd, Member, U.S. Senate; (4) the Honorable James Shannon, President, National Fire Protection Association; (5) Mr. Michael Quill, Chief, Auburn, New York Fire Department; (6) Mr. Jeff Cash, Chief, Cherryville, North Carolina Fire Department; and (7) Mr. Mike McNeill, 9th District Vice President, International Association of Firefighters (IAFF), Denver, Colorado.

Summary of Hearing

Representative Curt Weldon testified to the changing responsibilities and the increased expectations placed on firefighters. He also testified to the decreased resources available to fire services, especially in the area of staffing. Representative Weldon suggested five amendments to the bill needed to provide career and volunteer fire departments with what they need most: 1) fund local fire departments directly instead of providing funds for states to distribute; 2) implement a provision barring funding fire activity lower than the average three years ago, thus providing consistency to program funding; 3) include a nondiscrimination clause to prevent discrimination within fire departments; 4) authorize funding through 2010; and 5) institute a peer-review process within the fire service community.

Representative Bill Pascrell emphasized the desperate need for adequate staffing in the Nation's fire departments, citing numerous

statistics that show they are drastically understaffed. He also cited examples of how this understaffing has directly contributed to the deaths of firefighters. In addition, he echoed Representative Weldon's comments that these funds should supplement local funds, not replace them.

Senator Chris Dodd, the chief Senate sponsor of companion legislation, noted the support some Members of Congress have given to the fire services since even before September 11, 2001. Since that time, the responsibilities of the fire services, and therefore, the demands placed on them, have increased dramatically. This has only exacerbated their staffing needs. Furthermore, he testified that since people live in one community and commute to work in another, it is more difficult than ever to recruit a volunteer force.

Mr. Shannon emphasized the need for more firefighters, professional and volunteer. He stated simply, "Closing these gaps requires more firefighters. There are no short cuts." He added:

- Insufficient staffing grossly impacts the safety and effectiveness of firefighters and decreases their ability to quickly respond to incidents.
- Sixty-five percent of the Nation's cities and towns cannot meet the Insurance Services Office guidelines for response times because of a lack of fire stations. Sixty percent or fewer of the departments serving small and medium sized populations could not respond with four firefighters per engine, the minimum number needed to safely initiate an interior attack.
- Bringing fire departments to a level that would meet federal guidelines would require an estimated 75,000 to 85,000 additional firefighters nationwide according to a needs assessment survey conducted by the National Fire Protection Association (NFPA).

Mr. Quill described the staffing situation of his department in Auburn, NY, including how many firefighters are required to respond to a structural fire, and noted that hiring any additional personnel would provide a huge benefit to fire departments and would vastly improve both safety and productivity. In addition, he testified that:

- Staffing in his department had decreased from 20 firefighters per shift in 1973 to 14 firefighters per shift currently. The decrease is due to budget cuts that impacted personnel first.
- Substantial gains in productivity can be obtained by a relatively small increase in personnel. Most jurisdictions can only staff a piece of fire apparatus with three firefighters. Since federal law requires firefighters to work in teams of two, adding one firefighter would double the number of working teams available on that apparatus.

Mr. Cash recommended that a recruitment and retention grant program be included in the SAFER bill. Volunteer firefighters currently have a high turnover rate and have seen their numbers decrease by fifteen percent over the last twenty years. A recruitment and retention grant program would significantly improve the volun-

teer firefighter community at a fraction of the cost of hiring grants. He added:

- Some recruitment and retention program examples include national and local recruitment campaigns, the creation and augmentation of length of service award programs, other pension programs for volunteers, tuition assistance for higher education, and affordable housing programs.
- Prior to September 11, 2001, most local fire departments could respond to the majority of their calls, perhaps with assistance from neighboring departments. Since then, in addition to their traditional responsibilities, they have been called upon to respond to incidents involving hazardous materials, weapons of mass destruction, and terrorism. In order to be prepared for such incidences, they will require federal financial assistance.

Mr. McNeill noted that with the new, post-9/11 responsibilities placed on the fire services—responding to hazardous materials, weapons of mass destruction, and terrorists incidents—fire departments must be prepared to respond to an act of war each time an alarm rings. This compounds the already drastic staffing shortages. He added:

- The current economic downturn has exacerbated the staffing situation. Fire departments in my district have had to cut back on personnel and may have to endure rolling blackouts where a fire station is closed for a day on a rotating basis. Unfortunately, my district is not unique in this respect.
- The Federal Government has a responsibility to help communities attain minimum staffing levels necessary to operate safely and effectively. Furthermore, if the fire services are going to be able to respond to future attacks against the homeland, the Federal Government must address the staffing shortages.

4.1(j)—Supercomputing: Is the U.S. on the Right Path?

July 16, 2003

Hearing Volume 108–21

Background

On July 16, 2003, the House Science Committee held a hearing to examine whether the United States is losing ground to foreign competitors in the production and use of supercomputers and whether federal agencies' proposed paths for advancing our supercomputing capabilities are adequate to maintain or regain the U.S. lead.

The witnesses were: (1) Dr. Raymond L. Orbach, Director, Office of Science, Department of Energy; (2) Dr. Peter A. Freeman, Assistant Director, Computer and Information Science and Engineering Directorate, National Science Foundation (NSF); (3) Dr. Daniel A. Reed, Director, National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign; and (4) Mr. Vincent F.

Scarafino, Manager, Numerically Intensive Computing, Ford Motor Company.

Summary of Hearing

Dr. Orbach described the Department of Energy's plans for developing supercomputers and using supercomputing capacity to tackle problems in cutting edge fields such as nanotechnology and biotechnology. Specifically, he addressed four questions posed to him by the Committee.

- The Office of Science will collaborate with the National Nuclear Security Agency (NNSA) to design the next generation of supercomputers; however, the machines the NNSA has used in the past have been massively parallel, which are not very efficient when applied to many problems of scientific or industrial interest.
- The Office of Science is also working on a memorandum of understanding with the Department of Defense that establishes a framework for cooperation with the Defense Advanced Research Projects Agency on designing new computer architectures.
- The High-End Computing Revitalization Task Force (HEC–RTF), which was formed by the Office of Science and Technology Policy (OSTP) and is co-chaired by an Office of Science official, is an indication of how much importance the Administration places on high-end computing. The Office of Science expects to play a major role in executing the recommendations of the task force.
- The high-performance computing needs of the scientific and private sectors are not diverging. Any advances the Office of Science makes in this field will be applicable to industry.

Dr. Freeman testified that, in general, the U.S. is on the right path when it comes to supercomputing, as long as the efforts are embedded in a larger cyber infrastructure that also includes massive storage, high-performance networks, databases, lots of software, well-trained people, and that is available to all scientists and engineers. Additionally, Dr. Freeman stated that:

- NSF's traditional role is to innovate new supercomputing computational mechanisms and applications and to ensure that there are appropriate educational programs in place to train scientists and engineers to use these new tools.
- NSF is committed to the recommendations of their cyber infrastructure advisory panel, the Atkins Committee, and to making supercomputing facilities a key element of the NSF grid computing effort.
- NSF is actively participating in the HEC–RTF.
- The high-performance computing needs of the scientific and private sectors are not diverging. He described the relationship as symbiotic, with each group taking advantage of each other's technological advances.

Dr. Reed testified that there is not enough time available on existing high-end computing systems and the capabilities of the exist-

ing systems are not adequate to address the research challenges and opportunities. In addition, the planned new systems will not fully address this shortfall. Dr. Reed went on to highlight three points about the current status of advanced scientific computing.

- NSF has been pivotal to providing high-end computing resources to the scientific and engineering communities. Before NSF undertook this activity, access to supercomputers was limited to restricted cases at national laboratories. NSF must continue in this role.
- Researchers feel they need sustained speeds of 25–100 teraflops to make new scientific discoveries. This will require long-term, sustained investment in both hardware and software.
- Collaboration between industry and government, and sustained investment is critical to future development of high-end computing systems.

Representing the industry perspective, Mr. Scarafino testified that more advanced computing capabilities will be essential if the U.S. is to remain competitive in the auto industry. He warned that the Federal Government cannot rely on economic forces to spur development in high-end computing; only the video game industry has enough volume to drive that kind of development. The Federal Government should, instead, work to advance the design of new computing architectures and other necessary components. He added:

- The Federal Government previously aided in the development of high-end computing but switched to relying on off-the-shelf components to make parallel architectures in the mid-1990's. This worked well in many applications, but some of the hardest problems do not fit well into parallel architectures.
- Ford Motor Company uses high-performance computing in the design of its products for performance in both nominal and extreme conditions. Modeling and simulation help accelerate the design cycle and help engineers balance design requirements like performance, durability, crash worthiness, and occupant and pedestrian protection.
- Significantly faster computing resources would improve the ability to predict vehicle safety and the durability and wind/noise characteristics.

4.1(k)—The Columbia Accident Investigation Board Report

September 4, 2003

Hearing Volume No. 108–27

Background

On September 4, 2003, the Science Committee held a Full Committee hearing on the findings and recommendations of the *Columbia* Accident Investigation Board (CAIB). The Committee received testimony from retired Navy Admiral Harold Gehman, Chairman

of the 13-member board, along with Board Members Major General Kenneth W. Hess, Dr. James N. Hallock, and Dr. Shelia Widnall.

Summary of Hearing

Admiral Gehman briefly summarized the *Columbia* Accident Investigation Board's Report, identifying it's scope, process, conclusions, and recommendations before taking questions from Members regarding the specifics of the Report. Members praised the Board's work as being thorough and insightful.

Chairman Boehlert stated, "Admiral Gehman and all the members of the *Columbia* Accident Investigation Board have earned our respect for their selfless and tireless work, their rigor and their independence. They have performed a great service to the Nation and particularly to those of us who must set policy for NASA. Quite properly, the CAIB report focuses on managerial as well as technical lapses, and on the future, as well as on the past. They have given us alot to think over."

Admiral Gehman listed several recommendations in the report that were necessary for return-to-flight, and several that were necessary for continued flight. These varied depending on safety priorities, and the length of time they required to be implemented.

Some of the major points expressed by Admiral Gehman in his testimony included the formation of an Independent Technical and Engineering Authority that would be outside of the Shuttle program structure, and responsible for the handling and adjudicating waivers to program requirements. Additionally, he stressed the need for Congress, the Administration, and the public to develop a national vision for U.S. space policy that NASA could follow, and the need for change in NASA's safety organization.

The Committee uniformly agreed that, in response to the CAIB Report, Congress and the Administration must now chart the future for NASA and that it needs to do so without any preconceived notions about what the space program should look like. Member's noted that we need to put together a full picture of the actual risks and costs of the Space Shuttle before deciding whether and how the program should be run.

4.1(l)—NASA's Response to the Columbia Report

September 10, 2003

Hearing Volume No. 108–28

Background

On September 10, 2003, the Science Committee held a Full Committee hearing on the National Aeronautics and Space Administration's (NASA) response to the *Columbia* Accident Investigation Board Report. The Committee received testimony from NASA Administrator Sean O'Keefe and retired Navy Admiral Harold Gehman, Chairman of the *Columbia* Accident Investigation Board (CAIB).

The hearing examined NASA's plan, "NASA's Implementation Plan for Return-to-Flight and Beyond," which was NASA's response to the CAIB report. Issues included whether the plan fully complied with the CAIB recommendations; the cost and schedule asso-

ciated with implementing the plan; whether the task group (led by the two former astronauts Thomas Stafford and Richard Covey) that NASA appointed to oversee return to flight provided the best mechanism to assess NASA's implementation; and the criteria used to determine when the Shuttle is ready to return to flight. The hearing also reviewed the impact a significant delay in return-to-flight might have on the International Space Station, the Hubble Space Telescope, and the proposed Orbital Space Plane.

Summary of Hearing

Member questioning focused on "NASA's Implementation Plan for Return-to-Flight and Beyond," and whether it was consistent with the recommendations of the *Columbia* Accident Investigation Board's Report, and further, whether it's specific responses fully addressed the concerns and requirements set forth by the Board.

Areas of concern were the applicability of the newly formed NASA Safety and Engineering Center (NESC) in Langley, Virginia to the CAIB's requirement for an Independent Technical Authority to have responsibility for handling and adjudicating waivers rather than the individual program offices; and the independence of the Stafford-Covey Return-to-Flight Task Force that NASA has charged with reviewing it's implementation of the CAIB report.

Administrator O'Keefe described the Return-to-Flight Plan as a "living document" that would be periodically updated as plans are refined and progress is made in making technical, management, cultural, and safety changes. He also indicated that NASA would work closely with Congress and the Stafford-Covey Return-to-Flight Task Force to assure that the Shuttle only returns to flight when it is safe to do so.

Members pointed out that NASA has a poor record of fully implementing recommendations from previous reports, particularly non-technical recommendations. Therefore, the Members noted that a key issue is whether NASA will fully satisfy the CAIB recommendations, particularly how NASA will implement the central organizational recommendations of the CAIB, such as creating an independent technical authority.

4.1(m)—The Future of Human Space Flight

October 16, 2003

Hearing Volume No. 108–29

Background

On October 16, 2003, the Committee on Science held a hearing on the Future of Human Space Flight. The hearing examined the rationale for human presence in space, the feasibility and cost of various potential long-term goals, and the near-term implications of establishing these goals.

The witnesses included Dr. Michael Griffin, President and Chief Operating Officer of In-Q-Tel and a former NASA official; Dr. Wesley Huntress, Director of the Carnegie Institution's Geophysical Laboratory and a former NASA official; Dr. Matthew Koss, Assistant Professor of Physics, College of the Holy Cross; Dr. Alex Roland, professor of history, Duke University; and Dr. Bruce Murray,

Professor Emeritus of Planetary Science and Geology at the California Institute of Technology and a former director of NASA's Jet Propulsion Laboratory.

Summary of Hearing

Expert witnesses testified that NASA's current human space flight program "is not moving us toward any compelling objective, and we should make a transition out of it as soon as possible." All five witnesses at the hearing agreed with that statement, when asked by Chairman Boehlert.

In response to further questioning from Boehlert, all five witnesses also agreed that "the primary reason for human exploration is the impulse to explore, rather than any more utilitarian goals—although there can be collateral benefits; that we can take on ambitious goals without massive increases in the NASA budget; and that we should avoid sacrificing other NASA programs to achieve our human space flight goals." In addition, Drs. Griffin, Huntress and Murray agreed that, "the long-term goal of the human space flight program should be getting to Mars, and preferably starting colonies or outposts in space."

In opening the hearing, Chairman Boehlert said, "Today's hearing is just the beginning of our efforts to build a national consensus" on this issue. He added, "We need to be thoughtful and deliberate and coldly analytical in putting together a vision for the future of human space flight. It has to be a long-term vision; we're not about to embark on any crash program—the technical challenges alone are enough to prevent that."

Ranking Democrat Ralph Hall (D–TX) added, "The human exploration of space is a fundamental expectation of the American people—indeed of people all over the world. However, we remain unwilling as a nation to commit to a clear set of goals for the human space flight program and to the resources required over the long haul to achieve them. We can and should do better. Rep. Nick Lampson on our Committee has reintroduced the *Space Exploration Act of 2003* (H.R. 3057), which would establish a phased set of goals for America's human space flight program, whereby the achievement of each goal helps provide the capabilities needed to attain successive goals. I am proud to be a co-sponsor of Mr. Lampson's bill; its adoption would go a long way towards providing a rational framework for our human space exploration investment decisions."

Witnesses called for a renewed sense of purpose and a more focused vision for NASA's programs. Huntress testified that the Space Station and Space Shuttle do not merit the risks that they entail. He said, "If space explorers are to risk their lives it should be for extraordinarily challenging reasons—such as exploration of the Moon, Mars, and asteroids, and for construction and servicing space telescopes—not for making 90 minute trips around the Earth. The whole point of leaving home is to go somewhere, not to endlessly circle the block." Similarly, Dr. Murray said the current NASA programs have us "bogged down" in low-Earth orbit.

"It is hard to explain the human space flight mission to the public unless we talk about destinations," Subcommittee on Space and Aeronautics Ranking Democrat Bart Gordon (D–TN) said. "The re-

ality is that technology programs that are not tied to specific—and agreed-upon—mission goals become very vulnerable to budget cuts or even cancellation over time."

Dr. Koss, a scientist who has had several experiments on Shuttle missions, stated that the science currently being conducted in space is not worth the risk. "The vast majority of physical science experiments conducted in orbit simply do not require on-board human intervention or assistance," said Dr. Koss. Dr. Koss argued that unless a researcher could prove that the experiment needed human interaction, it should not put human lives at risk.

Dr. Griffin said a far more ambitious NASA program could be run for $20 billion a year—about $5 billion more than NASA is currently receiving. Dr. Huntress agreed with that figure, and Drs. Roland and Murray said a worthwhile program could probably be run with no additional funds at all. In response to a question posed by Subcommittee Chair Dana Rohrabacher (R–CA), Dr. Griffin said he would be willing to fund NASA at that level, even if such an increase forced cuts in university research programs. Dr. Huntress said he would not be willing to make such a tradeoff. All the witnesses emphasized that an Apollo-style crash program was neither necessary nor wise.

Dr. Roland went the furthest of the witnesses in his suggestions for the current NASA program. "The United States may have a long-term future in human space flight," he said, but "for the near term. . .human space flight should be suspended, or at least drastically curtailed. If the Shuttle flies at all, it should fly unmanned, or at worst with a minimal crew. The Space Station should be mothballed or converted to a space platform, a research facility to be visited periodically for refueling, maintenance, and changing experiments." Roland added, "The problem, of course, is the Shuttle.. . .While it is a technological marvel, it is also the world's most expensive, least robust, and most deadly launch vehicle."

Dr. Murray agreed that such a hiatus might be necessary to put human space flight on a path for future success. He said, "[T]he political leadership of this country must also insist on NASA developing and presenting a range of realistic alternatives to its current Shuttle/Space Station plans that can enable a credible national commitment to a paced Mars human flight program. These alternatives necessarily should include multi-year suspensions of U.S. human flight as NASA elected to do in 1975–1981, when NASA suspended U.S. human flight entirely after the Apollo-Soyuz mission until the first Shuttle test flight in order to create the budget wedge enabling the Shuttle to be developed. Only by considering such painful alternatives can the relentless decline into mediocrity and irrelevance of U.S. human space flight be reversed within realistic budget considerations."

4.1(n)—NASA's Organizational and Management Challenges in the Wake of the Columbia Disaster

October 29, 2003

Hearing Volume No. 108–30

Background

On October 29, 2003, the House Committee on Science held a hearing to address the organizational and management issues confronting the National Aeronautics and Space Administration (NASA) in the aftermath of the Space Shuttle *Columbia* accident. According to the *Columbia* Accident Investigation Board (CAIB), NASA's "organizational culture and structure" had as much to do with the *Columbia*'s demise as the physical causes of the accident. During the course of its nearly seven months of investigation into the causes of the accident, the CAIB encountered an ineffective and disengaged safety organization within NASA that "failed to adequately assess anomalies and frequently accepted critical risks without qualitative or quantitative support." Based on its findings, the CAIB recommended significant changes to the organizational structure of the Space Shuttle Program.

To give a sense of some of the ways NASA could be restructured to comply with its recommendations, the CAIB report provided three examples of organizations with independent safety programs that successfully operate high-risk technologies. The examples were: the United States Navy's Submarine Flooding Prevention and Recovery (SUBSAFE) and Naval Nuclear Propulsion (Naval Reactors) programs and the Aerospace Corporation's independent launch verification process and mission assurance program for the U.S. Air Force.

The hearing provided an opportunity to examine each of these examples in depth, as well as the safety programs of the Dupont Corporation (an acknowledged industry leader in safety), to help determine how NASA should be reorganized.

The witnesses for the hearing were Admiral Frank L. "Skip" Bowman, USN, Director of the Naval Nuclear Propulsion (Naval Reactors) Program; Rear Admiral Paul Sullivan, USN, Deputy Commander for Ship Design Integration and Engineering, Naval Sea Systems Command; Mr. Ray F. Johnson, Vice President for Space Launch Operations for the Aerospace Corporation; Ms. Deborah L. Grubbe, Corporate Director for Safety and Health at E.I. du Pont de Nemours & Co., Inc. (Dupont) and Admiral Harold Gehman, Chairman, *Columbia* Accident Investigation Board testified as the sole witness on the second panel.

Summary of Hearing

The CAIB report recommended that NASA look at several models as it revamps its safety organization. The hearing examined these models to learn what steps NASA could take to reorganize its operations into a more safety-focused program. Members questioned expert witnesses about the key elements, identified by the CAIB, that are necessary for an independent and effective safety regime.

"I have no doubt that this committee will have ample opportunity over the next year or so to put to use the information we gather today.. . .NASA is just in the initial stages of putting together an organization plan, and I have complete confidence that Administrator O'Keefe has taken the CAIB recommendations to heart," said Chairman Sherwood Boehlert (R–NY). "But that said, I must note that I believe the initial organization ideas being circulated by NASA fall significantly short of the mark. We look forward to working with NASA as it continues to rework its plans."

Committee Ranking Member, Ralph Hall (D–TX) added, "Based on today's testimony, it's clear to me that the responsibility for protecting safety from budgetary and schedule pressures has to start at the top of an organization and flow through all levels of management. The hearing also reinforces my belief that independent oversight has an important role to play in ensuring continued attention to safety."

Admiral Bowman said that his Navy program probably had one of the flattest organizational structures possible and that as the chief safety officer and director of the program he learned of all safety issues in real time, as they happened, with no filter from various layers of management.

Deborah Grubbe agreed, noting that "safety culture starts at the top of the organization" and that Dupont's leadership manages safety through intensive training of employees and recognition and reward of safety improvements and innovation. DuPont also fosters an environment in which bringing safety problems to light is encouraged and rewarded.

Ray Johnson testified on the importance of a balance between independence and collaboration. Johnson noted that his organization is completely separate from the Air Force programs they are charged with overseeing. Moreover, the Aerospace Corporation's sole focus is on the safety of the space launches, but they share overarching goals with the Air Force office they work closely with.

Fighting off complacency was one of the biggest challenges cited by Rear Admiral Paul Sullivan. Sullivan said that his program held an annual safety training session in which all employees were reminded of the demise of the submarine USS Thresher in 1963. This accident led the Navy to create the SUBSAFE program, with the effect that the Navy has never again lost a SUBSAFE certified submarine due to a safety or maintenance problem. By keeping the consequence of complacency at the forefront of everyone's mind, Sullivan said that it was easy for everyone to strive for a perfect safety record.

Research Subcommittee Chairman Nick Smith (R–MI) noted, "There are both private and public sector organizations that achieve high reliability, fault tolerance, and low fatalities, such as the Navy's nuclear submarine program and nuclear reactors. NASA could benefit by reforming its operations. Instead, it looks like NASA is planning to not so much return to flight but to business as usual. But business as usual does not work. This hearing is part of an effort to make sure that NASA does not ignore safety concerns again."

The Chairman of the *Columbia* Accident Investigation Board (CAIB) told the House Science Committee that "A year from now

or 18 months from now, when cost and schedule pressures have resumed, I don't think we want to rely upon the intervention of management to snatch victory from the jaws of defeat," added Gehman. "I think we want to institutionalize a process by which these issues can be raised or sorted out without having top-level management to intervene."

4.1(o)—Nanotechnology Research and Development: The Biggest Little Thing in Texas

December 5, 2003

Hearing Volume No. 108–37

Background

On December 5, 2003, the House Science Committee held a hearing to examine the emerging nanotechnology industry and the value of research and development programs to job creation and economic development within the U.S. nanotechnology sector.

The witnesses were: (1) Dr. Rick Reidy, Research Professor, University of North Texas; (2) Dr. Da Hsuan Feng, Vice President for Research and Graduate Education, University of Texas, Dallas; (3) Dr. Ron Elsenbaumer, Vice President for Research, University of Texas, Arlington; (4) Mr. Chris Gintz, CEO, NanoHoldings LLC; and (5) Dr. John Randall, Chief Technology Officer, Vice President of Research, Zyvex Corporation.

Summary of Hearing

Dr. Reidy hopes that the emergence of nanotechnology will spur the imagination and vocations of budding scientists, much like the space program did in the 1960's. Directing new talent into science and engineering will provide the researchers needed to meet the challenges of nanotechnology. Also, the programs that cultivate youth interest should be as creative and fresh as possible. Dr. Reidy went on to testify about the needs of the research community and the impacts nanotechnology will have.

- All research needs initial start-up funding to pay for student researchers, appropriate equipment, and working materials. With nanotechnology, however, the research topics are often so unexplored that they are only funded through one-year exploratory grants. Research institutions should be encouraged to provide sufficient funding to overcome the initial "proof of concept" phase.
- Financial support of major equipment purchases must be accessible to all institutions with a proven need. Without it, nanotechnology will become the province of only a few universities.
- Many universities that do not have the capabilities to transfer their basic research to industry will have to participate in joint research ventures, where basic and applied research is done at the university but product development occurs through an industry partner.
- The industries most likely to see improvements through nanotechnology are electronics and biotechnology. There is

currently a healthy environment for nanotechnology start-up ventures. The newly formed Center for Advanced Research and Technology can become an incubator for these small technology companies.

Dr. Feng was responsible for bringing the nanotechnology experts to the NanoTech Institute at UT-Dallas. The Institute has focused on using nanotechnology to find and utilize new energy sources without damaging the environment, which they refer to as NanoEnergetics. The Institute also focuses on assembly of nanofibers into high performance fibers. Additionally, he testified:

- Most products in the future, from cancer treatment products, to smaller and faster computers, to the skins of advanced aircraft, will depend in some way on nanotechnology.
- One barrier to the incorporation of nanotechnology is the high cost of producing materials on laboratory scales. Producers do not want to risk money improving material production until customers are clearly identified, and users do not want to invest money on evaluating materials until they can be guaranteed a low cost.
- Cradle to the grave assurance of material and product safety is also an important issue to consider.
- The best practice for transferring basic research to industry is for universities to partner early on with the most appropriate companies.

Dr. Elsenbaumer characterized nanotechnology as the driving force for developing smaller, lighter, more energy efficient, less costly, and stronger materials, devices and processes. It will be a major factor in U.S. economic growth and job creation for decades to come, impacting the electronics industries, medical industries, and the energy sector most dramatically. Dr. Elsenbaumer also testified that:

- The success of nanotechnology will require long-term funding, which will have to be the responsibility of the Federal Government because private industry will not fund long-term, wide-ranging research projects.
- The best approaches for transferring basic research to industry are to develop industry, university, and government partnerships early in the process, and create new small businesses that are facilitated through technology incubators.
- General public concerns over perceived environmental, ethical, and societal dangers could slow acceptance of nanotechnology.

Mr. Gintz testified representing an investment company that builds early stage nanotechnology companies around exclusive licenses from leading universities for their most promising discoveries. They use a disciplined business approach to tackle very large national problems but also try to ensure that each company delivers its first commercial product within the first three years. University centers such as the one at the University of North Texas are ideally structured to acquire the grant funding and foster the out-of-the-box thinking and global collaboration needed for break-

throughs in this field. It is their hope that the scientific developments will lead to many well paying jobs in the local economy.

Dr. Randall testified on behalf of Mr. James R. Von Ehr, II, Chairman and CEO of Zyvex Corporation. He believes that to bring about the nanotechnology revolution, we need to improve commercialization of university research, create more opportunities and competition for small businesses, and issue grand challenges that the American public can understand and embrace. He added:

- It benefits the country when universities protect their intellectual property, but only if there is a successful transfer of that property to an industry that can develop it into applications and services.
- The Federal Government should implement a measurement system to gauge how well a university has transferred its research to industry when deciding how to award federal R&D funds. This would encourage universities to be more discerning about which intellectual property they decide to protect and be more flexible about licensing terms.
- The National Institute of Standards and Technology's Advanced Technology Program has been instrumental to industries at overcoming funding gaps.
- We need to encourage more students and skilled workers to come to the U.S. while still finding ways to balance security needs.
- To mobilize public interest, we should articulate grand challenges. The National Nanotechnology Initiative lists nine grand challenges, but this is too many to be useful. Instead, focus on one or two grand challenges, such as reducing dependence on foreign energy or regaining our position as the world leader in manufacturing.

Supercomputing is also referred to as high-performance computing, high-end computing, and sometimes advanced scientific computing.

4.1(p)—Fueling the High Technology Workforce With Math and Science Education

January 23, 2004

Hearing Volume No. 108–38

Background

On Friday, January 23, 2004, the House Science Committee held a field hearing to examine various strategies underway to improve student achievement and teacher performance in math and science education. This hearing also discussed the value of a well-educated science and technology workforce to job creation and economic vitality.

The witnesses were: (1) Ms. Rachel Purcell, Valedictorian, Class of 2004, Campbell High School; (2) Mr. Randy McClure, Teacher and Department Chair for Science, Campbell High School; (3) Mr. J. Martez Hill, Policy Director, Georgia Department of Education; (4) Dr. Paul Ohme, Director, Center for Education in Science,

Mathematics, and Computing, Georgia Institute of Technology; and (5) Mr. C. Michael Cassidy, President, Georgia Research Alliance.

Summary of Hearing

Ms. Purcell is the Valedictorian of the Senior Class at Campbell High School and plans to pursue veterinary medicine in the future. She testified from a student's perspective about the state of math and science education and discussed her personal experiences with math and science education. She gave several examples of what she believes has made her successful. Specifically she noted that:

- Her interest in science and math exists because she was exposed at a young age to a hands-on method of learning. She gave the example of dissecting a cow's eye as one activity in particular that piqued her interest in science.
- She said that many students learn best by seeing how science and math can be applied to real world situations.
- She concluded that interest in advanced science and math classes in high school and college can be generated and augmented by exposing younger kids to the more enjoyable aspects of both math and science.

Mr. McClure testified about what he sees as the problems in math and science education from his 18 years of experience in K–12 science and math education, during which has served as both a teacher and an administrator. He is currently a teacher and the head of the Science Department at Campbell High School. In his testimony he noted the following:

- There is a serious lack of training for teachers in the use of modern technology to demonstrate scientific principles. For example, many students still use litmus paper instead of digital probes to measure pH levels. Until classroom technology and teaching methods catch up with the latest practices, students will be severely hindered in their ability to learn modern math and science.
- Because of the great speed at which the field of science progresses, curricula must be flexible to keep students interested.
- Classrooms should be more inquiry-based and less test-oriented. More should be done to create an atmosphere that will inspire and generate interest in science fields.

Mr. Hill testified on behalf of the Georgia Department of Education about the current status of math and science education in his state. He highlighted three different initiatives and programs in his testimony:

- The State of Georgia is using their Georgia Performance Standards as a base for achieving the goals of No Child Left Behind. He noted that Georgia has been trying to lessen the number of topics to be covered in math and science so that teachers have time to go into more depth on certain issues.
- The Math and Science Partnership (MSP) program at the National Science Foundation (NSF) is being used to recruit,

train, and retain the best and brightest math and science teachers for the Georgia schools.

- The Partnership for Reform in Science and Mathematics (PRISM) was awarded $34.6 million from NSF in September 2003 to raise achievement levels and close performance gaps. This program will directly affect 170,000 students and 10,000 teachers by supporting professional development for educators and providing for revision of Georgia's Performance Standards in math and science.

Dr. Ohme, Director of the Center for Education in Science, Mathematics and Computing (CEISMC) at Georgia Tech, made four major recommendations for improving science and math education at the K–12 level:

- The most important thing is to have an expectation that all children can and will learn mathematics and science at a high level.
- The second most important thing is to have a highly qualified, engaging, and motivated teacher that is committed to the success of every student.
- Third, current professionals in math, science, and technology are key to developing a quality educational program.
- Finally, the lack of performance in science and math is perhaps due to the fact that we are not engaging our students at advanced levels in math and science.

Mr. Cassidy is the President of the Georgia Research Alliance, a strategic partnership of universities, businesses, and government whose goal is to leverage the state's research capabilities into economic results. Mr. Cassidy testified that:

- The key to Georgia's economic growth is a highly trained, highly skilled technical workforce. For this reason, Georgia has been actively recruiting researchers to their universities and providing the necessary resources for them to conduct their work. An example of the success of this program has been the creation of some 120 new high-tech startups.
- To further encourage this economic growth there must be a strong foundation of math and science education.
- The challenge ahead will require close collaboration between academia, industry, and government.
- Students need heroes and role models from the world of math and science like they have in the fields of sports and entertainment.

4.1(q)—Tools for Enhancing Small Business Competitiveness in the Dallas Area: A Review of Federal Programs

January 23, 2004

Hearing Volume No. 108–39

Background

On Friday, January 23, 2004, the House Science Committee held a hearing to increase awareness of the Small Business Innovation Research (SBIR) Program and the Small Business Technology Transfer (STTR) Program, and to learn more about the opportunities that these programs offer to small businesses.

The witnesses were: (1) Mr. Joseph Montes, Administrator, Region VI of the Small Business Administration (SBA) who was accompanied by Mr. Lavan Alexander, District Director, Dallas-Fort Worth area for SBA; (2) Dr. Jo Anne Goodnight, Director of SBIR and STTR for the National Institutes of Health; (3) Dr. Da Hsuan Feng, Vice President for Research and Graduate Education and Professor of Physics, University of Texas at Dallas; (4) Dr. Robert Slocum, Chairman and Chief Technical Officer, Polatomic, Inc.; and (5) Dr. Oliver Murphy, President, Lynntech, Inc.

Summary of Hearing

Chairman Smith expressed concern that companies that have a track record with the program and understand the bureaucracy have an advantage in securing funding. He suggested that a small portion of the profits from products developed using SBIR funds could be placed in a fund to help new businesses apply for grants. Ranking Member Johnson expressed concern that the Dallas area is not receiving its fair share of SBIR and STTR grants. The SBA Regional Administrator agreed to work with her on an upcoming seminar that is being put on to educate businesses in the region about the program.

Mr. Montes testified that SBIR is a highly competitive program that encourages small business to explore their technological potential and provides the incentive to profit from its commercialization. Small businesses need only to certify that they meet the following eligibility criteria to participate in the SBIR and STTR programs: (a) The applicant must be organized for profit; (b) The applicant must be 51 percent owned and controlled by one or more U.S. citizens or permanent resident aliens and must have a significant place of business in and operate primarily within the U.S.; (c) Principal researcher must be employed more than 50 percent by the small business; and (d) The applicant's business must be 500 employees or fewer. SBA's role in the SBIR and STTR programs is to:

- Develop, coordinate, issue and update the policy directive.
- Develop and administer information and outreach programs for the SBIR and STTR programs.
- Develop and maintain a source and information file of interested small businesses.

- Survey, monitor and report on each agency's SBIR and STTR programs.
- Report annually to Congress on each agency's SBIR and STTR program.

Dr. Murphy testified that as venture capitalists have become increasingly less willing to make seed investments in start-up technology based ventures, small businesses face the challenge of securing the needed capital to demonstrate the technical and commercial feasibility of their concepts or ideas. The unique aspect of the SBIR and STTR programs is that they provide small businesses the difficult-to-obtain early stage financial support necessary to develop high-risk, high-payoff technologies. He added:

- Lyntech's commercialization plan includes licensing arrangements, spinoffs, joint ventures, and outright sale of developed technologies where appropriate.
- Critical to the success of Lynntech in developing and commercializing new technologies has been its participation in and support by the SBIR programs of almost all of the Federal Government departments and agencies.
- To date Lynntech has received 80 U.S. patents and in some cases corresponding foreign patents that were developed at least in part with SBIR funding.

Dr. Goodnight testified that the SBIR and STTR programs have become fully integrated into the overall scientific programs and goals of the NIH. The SBIR and STTR programs contribute significantly to the NIH mission to improve human health—particularly with regard to the goal of translating scientific findings and advances "from the test tube to the medicine cabinet," as well as through the development of innovative products or services that speed the process of discovery, reduce the cost of medical care, and improve research tools. Some of the topic areas identified in our grant solicitation include, but are not limited to, biodefense, biosensors, nanotechnologies, bioinformatics, imaging technologies, bioengineering, behavioral research, computational biology, telehealth technologies, and proteomics/genomics. She added that seven effective steps for obtaining an SBIR and STTR grant are:

- Start with an innovative idea with commercial potential.
- Understand NIH's mission and areas of research it supports. These are described in the grant and contract solicitations and on the websites of the NIH ICs.
- Contact relevant program staff to discuss the project and identify a potential "fit" in an IC's programmatic area.
- Submit an application for scientific and technical merit review.
- Discuss with program staff the outcome of the review and obtain guidance for next steps.
- Meet the eligibility criteria for a small business concern as defined by the Small Business Administration.
- Demonstrate research integrity.

Dr. Feng testified that, from a research university perspective, sustainable collaborations between industry and university partners are critical to the ongoing success of universities. Partnering between small businesses and universities is much more feasible because of the SBIR and STTR programs. While a small company is certainly capable of doing some of its research, it is much more cost-efficient, and intellectually exciting to partner with outstanding university researchers, who have access to brilliant young minds. The SBIR grants are an invaluable way for small businesses looking to develop those partnerships because they provide the economic ability to continue research with the assistance and resources of a university. He also added:

- During fiscal year 2002, fewer than 20 companies in North Texas applied for SBIR grants—540 grants with a total of $106,844,952,were awarded to Texas companies.
- In contrast, 2,394 grants, with a total of $598,525,294, were awarded in California.
- As small business becomes familiar with many advantages of the SBIR program, universities will be able to use their research talents to assist small businesses and make them more economically viable while strengthening the educational opportunities of both faculty and students.

Dr. Slocum testified that the primary area of research at Polatomic funded by SBIR is advanced laser magnetic field measurement systems. Polatomic has become the world leader in laser magnetometers. A second research area supported by SBIR funding is research and development of metal nanostructures for polarizing light and biohazard detection nano chips. SBIR awards have enabled Polatomic to start with a single person in 1982 and assemble a highly qualified team of scientists and engineers to attack and solve high priority "large company" problems in a "small company" environment without significant outside venture capital investors. He added:

- One problem with the SBIR program is the long gap between the conclusion of Phase I and the award announcements for Phase II.
- It is often difficult to hold a team together through this funding gap.
- Preparation of a winning proposal for small businesses new to the SBIR process is a fairly complex and confusing exercise.
- "Entry level" SBIR small businesses could use help getting started from funded local or state SBIR organizations and business schools working in conjunction with successful SBIR winners who serve as consultants and mentors.

4.1(r)—Strengthening Windstorm Hazard Mitigation: An Examination of Public and Private Efforts

February 9, 2004

Hearing Volume No. 108–40

Background

On Monday, February 9, 2004, at 1:30 p.m., the House Science Committee held a field hearing to examine the status of windstorm hazard mitigation in the United States, and to consider the role of federal research and development in windstorm hazard reduction.

The witnesses were: (1) Dr. Ernest Kiesling, Professor of Civil Engineering, Texas Tech University; (2) Dr. Charles Meade, primary author of the RAND study, "Assessing Federal Research Development for Hazard Loss Reduction;" (3) Dr. Bogusz Bienkiewicz, Professor of Civil Engineering and Director of the Wind Engineering and Fluids Laboratory, Colorado State University; and (4) Mr. Bryan Shofner, President, Shofner & Associates Insurance Agency.

Summary of Hearing

Dr. Kiesling presented testimony on the current state of research at Texas Tech University in the Wind Science and Engineering Program. He stated that:

- The main objective of the Wind Science and Engineering research program at Texas Tech is to improve the wind resistance of buildings. The benefits of increasing the wind resistance of buildings are two-fold—it protects life and reduces economic loss.
- Unfortunately, data on wind hazards is still limited. Because of this, the main area of progress has been in damage documentation. However, some progress has been made in reforming building codes and the development of "safe rooms" to protect occupants in the event of a wind hazard event.
- In order for more progress to be made, additional research funds are needed and property owners need to better understand the benefits of using improved construction techniques.

Dr. Meade presented testimony on both the contents of the RAND report, "Assessing Federal Research and Development for Hazard Loss Reduction," and additional questions that had been proposed by the Committee. He noted that:

- The U.S. is growing more vulnerable to wind hazards because of two trends: (1) increasing development near the Atlantic and Gulf Coasts, and (2) increasing prevalence of manufactured homes.
- The current economic losses from wind hazards are very difficult to estimate; however, RAND's current estimate puts the figure at nearly $7 billion per year.
- Current federal funding on wind hazards is focused primary on weather forecasting ($755 million) as opposed to research and development to address infrastructure losses ($11 million). This is problematic because while forecasting can save

lives, it does little to limit the property damage caused by windstorms.

Dr. Bienkiewicz is the current President of the American Association for Wind Engineering. He testified about the current state of the art in the field of wind research. He noted that:

- The wind engineering research conducted at Colorado State University has been ongoing for 40 years, and has included analysis of landmark buildings such as the Sears Tower in Chicago, as well as analysis of post 9/11 concerns such as the potential intentional release of chemical, biological, or radiological agents in various settings.
- While current efforts in wind hazard mitigation have been very successful in developing measures that have been put into practice to save lives, they have not resulted in preventing the material and business losses that these events cause.
- A coordinated, comprehensive, and long term effort is necessary to achieve significant reduction in property damage due to wind in the next 10 to 20 years. Furthermore, the proposed Wind Hazards Reduction Program, modeled after the National Earthquake Hazards Reduction Program, would provide the appropriate framework for such an effort.

Mr. Shofner discussed insurance industry efforts to understand wind hazards and also provided insight on what could be done to encourage people to be more adoptive of new technology to mitigate wind hazards. Specifically, he noted that:

- While the insurance industry is conducting little wind hazard mitigation research, they have gathered statistical information on the likelihood and severity of losses to wind hazards. However, at this time, access to this data is limited, as it is proprietary to the companies that have gathered it.
- The private sector "Insurance Services Office" provides statistical and actuarial information to companies that do not have their own data. They have also recommended specific credits be given for compliance to certain building codes.
- Due to lack of real data demonstrating that mitigation is truly effective, insurance companies have been reluctant to provide insurance incentives for mitigation. In light of this, retrofitting of homes is a very rare and expensive course of action.
- If data became available that mitigation was effective, and strict building codes were developed and implemented, it would be more likely that the insurance industry could, and would, provide incentives for these mitigation efforts.

4.1(s)—An Overview of the Federal R&D Budget for Fiscal Year 2005

February 11, 2004

Hearing Volume No. 108–41

Background

On Wednesday, February 11, the House Science Committee held a hearing to consider President Bush's fiscal year 2005 (FY05) budget request for research and development (R&D). Five Administration witnesses presented testimony on the proposed budget in the context of the President's overall priorities in science and technology.

The witnesses were: (1) Dr. John H. Marburger III, Director, Office of Science and Technology Policy (OSTP); (2) Dr. Rita Colwell, Director, National Science Foundation (NSF); (3) Dr. Charles McQueary, Under Secretary for Science and Technology, Department of Homeland Security (DHS); (4) Mr. Phillip J. Bond, Under Secretary of Commerce for Technology; and (5) Dr. Raymond L. Orbach, Director, Office of Science, Department of Energy (DOE).

Summary of Hearing

Dr. Marburger described the President's 2005 budget as an attempt to control and reduce the deficit while ensuring national security needs. He stated that the President strongly believes in the importance of American innovation, and understands the resources that are needed to advance it. Programs in the Department of Defense account for about half of the R&D funds, while the National Institutes of Health account for close to half of that remainder. The proposed 2005 budget commits 13.5 percent of discretionary outlays to R&D. Additionally, he stated that 5.7 percent of that total will be allocated to non-defense R&D, which is the third highest level in 25 years. Dr. Marburger highlighted several areas in which R&D budgets have been substantially increased, specifically:

- The Department of Defense will receive a sevem percent increase from the 2004 budget.
- Health and Human Services' budget will increase four percent, of which $28.6 billion will go to the National Institutes of Health.
- NASA's budget will increase 5.6 percent to $16.2 billion and NSF's budget will increase three percent to $5.75 billion.
- All of these proposed increases substantially exceed the average discretionary budget increase.

Dr. Colwell, who announced her resignation as Director of NSF at the hearing, noted that the NSF requested a $5.745 billion dollar budget for 2005 and regarded the Administration's willingness to meet the request as a vote of confidence in the importance and effectiveness of the NSF. She said that the NSF plans on investing both in R&D and in people involved with scientific R&D. Plans include:

- In 2005, the NSF will invest $76 million dollars in organizational excellence in order to make the investments produc-

tive and to ensure that NSF remains one of the most well managed agencies in the Federal Government. The investment will streamline NSF's operations so that the mounting workload and pressure may be ameliorated.

- NSF plans to award more interdisciplinary grants. The average annual award will be $142,000, an increase of 58 percent over the past seven years. Graduate stipends will also be increased under this budget in order to attract the Nation's best talent.

Dr. McQueary testified on behalf of the Science and Technology (S&T) Directorate of the Department of Homeland Security. The S&T Directorate receives $1.04 billion in the budget request, a 13.9 percent increase. He highlighted several of the Directorate's accomplishments during fiscal year 2004, including the deployment of biological pathogen monitoring systems, the establishment of testbeds to provide nuclear and radiation warnings, the initiation of extensive research concerning weapons detectors, and the disbursement of 100 fellowships and scholarships to advance U.S. leadership in science and technology. He announced plans for 2005, including:

- President Bush's new Biosurveillance Initiative.
- Scholarship and fellowship awards will continue, as well as the University Centers of Excellence, which will each examine a different aspect of terrorism.
- Counter-MANPADS (Man-Portable Air Defense Systems) work will conclude, which will improve technologies to protect commercial aircraft. Contracts will be awarded to integrate prototype equipment on selected aircraft.

Mr. Bond oversees the Commerce Department's Technology Administration (TA), which includes the National Institute of Standards and Technology (NIST), and also works closely with the National Oceanic and Atmospheric Administration (NOAA). The 2005 budget request for NOAA and TA is $3.4 billion and $529.8 million, respectively. These funds will be used for high-priority research in the areas of nanotechnology, environmental sciences, climate change, information technology, and manufacturing technology. In his testimony, Mr. Bond also acknowledged the need for cross-agency collaboration for scientific R&D and stated that he is committed to achieving this goal. He announced plans for the requested budget funds, including:

- NOAA will use funds to maintain and enhance programs targeted at the scientific understanding of the oceans, atmosphere, as well as the Nation's environmental health and economic vitality.
- NIST monies are needed to maintain and upgrade facilities.
- The Manufacturing Extension Partnership, which helps small manufacturers become more competitive, receives $39.2 million. NIST also requests funds to equip U.S. manufacturers with tools to track and respond to international technical standards that can block their entry to the market.
- NIST will continue to fund the Center for Neutron Research.

Dr. Orbach outlined several of the Department of Energy's plans for fiscal year 2005 and the funding needed for each. The DOE's budget plan focuses on the Nation's critical needs in the areas of energy, the environment, and national security. He testified that:

- The Office of Science requests $3.341 billion in order to increase research activities in computation, biological research, environmental remediation, fusion energy, materials, and nanotechnology R&D. The Office recently released "Facilities for the Future of Science: A Twenty-Year Outlook," which established guidelines for ambitious scientific discovery.
- DOE is requesting $410 million to establish a new laboratory for nuclear energy research, development, demonstration, and education, specifically to design a concept for the next-generation nuclear power plant.
- The Office of Energy Efficiency and Renewable Energy requests $1.25 billion in order to meet National Energy Policy goals. Additionally, the Office plans to develop ideas for the President's FreedomCAR and Hydrogen Fuel Initiative.

4.1(t)—U.S. Vision for Space Exploration

February 12, 2004

Hearing Volume No. 108–42

Background

On February 12, 2004, the Science Committee held a Full Committee hearing on the President's proposed space exploration initiative, which was proposed January 14, 2004. The hearing examined the scientific, commercial and national security goals of the project, as well as its expected cost. The Committee received testimony from the Honorable Sean O'Keefe, Administrator of NASA, and the Honorable John Marburger, Director of the Office of Science and Technology Policy.

Summary of Hearing

Members focused their questions on the program's cost, and asked whether, in a time of deficit spending, the expense was warranted. Members also expressed concerns that the budget and timeline for the project were insufficiently precise and that the project could draw funds away from NASA's existing space science programs. Ranking Democrat Bart Gordon pressed Mr. O'Keefe on the cost projections, criticizing the lack of cumulative cost estimates for each item in the President's plan.

Members also addressed the future of the Space Shuttle and the International Space Station. In response to a question from Chairman Boehlert, Mr. O'Keefe announced that a September 2004 return-to-flight was unlikely for the Shuttle. Members asked how a delay in return-to-flight would affect the budget and timetable for the new initiative and whether NASA would require the repeal of or modifications to the Iran Nonproliferation Act (INA) to complete construction of the International Space Station (ISS) as planned. Members also questioned scheduled dates for the retirement of the Space Shuttle fleet and the termination of the United States' in-

volvement in the International Space Station, both of which occur in the next decade in the President's plan.

Dr. Marburger also spoke on the decision to cancel the planned servicing mission to the Hubble Space Telescope (SM4).

"If serviced, I have no doubt that the Hubble would continue to provide world class scientific data and be used to further refine our understanding of our universe," said Dr. Marburger, "but the safety issues cannot be ignored and they must be considered not only with respect to the Hubble capability, but also the ever increasing capability of visible ground based telescopes combined with the exciting next generation space observatories now being built."

Representative Mark Udall disagreed, saying, "I share all of your concerns about safety. But I think you can make the argument. . .if it's safe enough to fly to the ISS, then it's safe enough to fly to Hubble."

Echoing other Members' concerns about the cost of the initiative, Chairman Boehlert concluded, "It should be evident to all concerned. . .that costs are a major consideration and there's a lot of uncertainty about the cost. And the [budget projection] chart, while attractive, leaves some questions for all of us."

4.1(u)—The Conflict Between Science and Security in Visa Policy: Status and Next Steps

February 25, 2004

Hearing Volume No. 108–43

Background

On Wednesday, February 25, 2004, the House Science Committee held a hearing to review the impact of enhanced security measures on the entry into the U.S. of foreign students and scholars. Specifically, the Committee considered whether the new security measures enhanced security or whether they were unnecessarily detrimental to the U.S. scientific enterprise. At the hearing, the General Accounting Office (GAO) released a new study, conducted at the Committee's request, on the extent of visa delays.

The hearing built upon a hearing the Committee held on visa issues on March 26, 2003 and on other hearings the Committee has held over the past two years on the impact of security concerns on scientific research.

The witnesses were: (1) The Honorable Asa Hutchinson, Under Secretary for Border and Transportation Security, Department of Homeland Security; (2) Mr. Jess Ford, Director, International Affairs and Trade, Government Accountability Office, (3) Ms. Janice Jacobs, Deputy Assistant Secretary, Office of Consular Affairs, Department of State, and (4) Mr. Robert Garrity, Jr., Deputy Assistant Director, Record/Information Administration, Federal Bureau of Investigation.

Summary of Hearing

Chairman Boehlert stated that our Nation would not be secure in the long run without a healthy scientific enterprise, and warned that an overly restrictive visa policy was not conducive to either science or security. Such a visa policy would deprive our scientific

community of the best minds from around the world and distract our security efforts from individuals that present a real threat. He noted however, that as a Member of the Intelligence Committee, he recognized the difficulty of deterring terrorists while welcoming legitimate students and scientists.

Under Secretary Hutchinson testified that the Department of Homeland Security's (DHS) goal was to facilitate open access to the Nation's academic institutions in a way that was consistent with national security. He emphasized that it was clearly not in the interest of the United States to unnecessarily impede legitimate foreign students or scientists. He added:

- The Homeland Security Act gave DHS responsibility for establishing visa policy, which it is doing in consultation with the Department of State. Specifically, DHS is focusing on (1) improving the visa revocation notification processes, (2) leading the country reviews of nations participating in the Visa Waiver Program, and (3) establishing the Visa Security Program.
- DHS has worked hard to improve the Student and Exchange Visitor Information System (SEVIS) by working to improve compliance, as well as ease of use of the system. Also created a SEVIS Response Team to check the validity of a student's academic standing.
- The Visa Mantis procedure was used to determine whether a foreign student would violate U.S. laws with respect to critically sensitive technology and information.

Mr. Ford presented the Committee with the Government Accountability Office's (GAO) report on the adjudication of student visas and discussed some of its findings and recommendations. These included the following:

- The average time for a Visas Mantis check was found to be 67 days.
- Security checks were delayed by interoperability between the Department of State and the Federal Bureau of Investigation (FBI).
- GAO recommends that the Department of State, DHS, and FBI develop and implement a plan to improve Visas Mantis, which would include milestones for reducing the number of outstanding cases and performance goals for Mantis cases. GAO also recommended focusing on the development of interoperable systems.

Ms. Jacobs testified that national security was the highest priority consideration in visa matters, but indicated that the Department of State was committed to facilitating the travel of legitimate visitors to the United States. She added:

- The referral to multiple agencies, each of which has to approve the case, resulted in processing delays in the past but the Department of State invested in people, technology, and new processes to shorten the delays.
- To further improve processing times, the Department of State has established procedures to expedite certain cases

with the FBI, extended the validity of Visas Mantis clearances, and given students and researchers top priority on the appointment queue.
- The Department of State plans to send quarterly reports to the field posts on their use of the Visas Mantis process.
- The Department of State is developing an electronic submission process to improve efficiency of interagency transfers.

Mr. Garrity testified that, because of the importance to national security, the FBI's primary responsibility is to conduct a thorough and accurate visa check. However, the FBI is aware of the impact of visa delays to the United States and our systems of education. He added:

- Eighty-eight percent of Visas Mantis requests were completed within 30 days and 98 percent of requests are completed within 120 days.
- Delays that caused a check to take longer than 60 days were the result of the time required to retrieve information from a field office. The FBI is trying to improve the decentralized record keeping system that caused these delays.
- The FBI is working with the Department of State to resolve all outstanding cases.

4.1(v)—Reviewing the Hydrogen Fuel and FreedomCAR Initiatives

March 3, 2004

Hearing Volume No. 108–44

Background

On March 3, 2004, the Committee on Science held a hearing to examine the Department of Energy's (DOE) Hydrogen Fuel and FreedomCAR Initiatives. Specifically, the hearing focused on two recent reports from the National Academy of Sciences (NAS) and the American Physical Society (APS) on DOE's hydrogen initiatives, and the Administration's response to the recommendations from the reports. The hydrogen program is one of the President's primary energy initiatives, and the two reports recommend changes to the program.

The Committee heard testimony from: (1) Mr. David Garman from the Department of Energy; (2) Dr. Michael Ramage, Chair of the National Academy of Sciences' (NAS) Committee on Alternatives and Strategies for Future Hydrogen Production and Use; and (3) Dr. Peter Eisenberger, Chair of the American Physical Society's (APS) Panel on Public Affairs Energy Subcommittee.

Summary of Hearing

Chairman Boehlert opened the hearing by emphasizing that the long-term security of the Nation, availability of resources for economic growth, and health of the environment are dependent on the hydrogen initiative. He noted that the President should be applauded for his foresight in proposing the Hydrogen Initiative and stated that it would take at least a decade to start on the path of

a hydrogen economy. The focus was on how to most adequately allocate funding for such an initiative. He noted that the NAS and APS are providing guidance through two reports that the DOE will be considering for implementation. Chairman Boehlert highlighted two main points that were made in both reports: first, that there is no way to discuss the transition to a hydrogen economy without addressing policy questions; and second, that he stands behind both reports which emphasize that more work on energy efficiency and renewable energy is necessary for a hydrogen economy to be clean and affordable. The Chairman said that he regrets the Administrations' proposition to pay for hydrogen research by cutting the funding to the DOE's Office of Energy Efficiency and Renewable Energy. In closing the Chairman noted that a hydrogen economy, despite the potential it has for helping to reach our energy and environmental needs, is not a panacea, and that work on hydrogen should not be an excuse to avoid conducting research in other areas, like creating stricter Corporate Average Fuel Economy Standards, promoting hybrid vehicles, and conducting research and design on interim solutions for energy and pollution problems.

Mr. Garman noted that his Office of Energy Efficiency and Renewable Energy in the DOE supports 35 out of the 43 recommendations proposed in the National Academy's report.

He highlighted two issues, one of which was funding for DOE hydrogen initiatives, which for Fiscal Year 2004 was $67 million short of the amount they had hoped to receive. Because of this, Garman said they will have to delay work in hydrogen production, storage, and technology validation. And secondly, continuing work on carbon sequestration is crucial because it is possible to derive hydrogen from coal. He stated that he would like to put to rest the notion that a hydrogen energy economy could only be environmentally beneficial if it was derived from renewable energy. He argued that deriving hydrogen from sources such as coal and nuclear could potentially be environmentally neutral if it were possible to sequester the byproducts properly.

Dr. Ramage's said the findings of the DOE-initiated National Research Council report that examined the technical and policy issues must be addressed to receive the benefits of a hydrogen economy. He noted that they reached four major conclusions in their February 2004 report:

1) hydrogen has the potential to replace all gasoline and reduce carbon dioxide (CO_2) from vehicular emissions;
2) the hydrogen initiative must be safe, appealing, economical and research-driven in areas such as fuel cell development, hydrogen storage, and distribution and production systems;
3) small, on-site production systems are needed at filling stations in order to help induce better transitions to a hydrogen fuel system; and
4) hydrogen could transform the energy system in the long term, and that it could reduce energy imports and CO_2 levels in the process.

He answered five questions about DOE's plan by noting that the NAS report advocated shifting away from development activities in some areas such as biomass gasification. They also advocated that

DOE be given the authority to engage in policy discussions to move the technology into the market, and ease the transition period in order to take the issue of infrastructure out of the equation.

Dr. Eisenberger highlighted the findings of the APS report on the Hydrogen Initiative, stating that major scientific breakthroughs are required for the Hydrogen Initiative to succeed. He stated that more cost-competitive options for the consumer need to be made available and current performance gaps need to be closed in order to facilitate the movement to a successful hydrogen economy. He noted that current hydrogen production methods are four times more expensive than gasoline and that current technologies are not capable of closing all technology gaps. He recommended increased emphasis on planning and research, and improving technological competitiveness, readiness, market acceptance, and rate of penetration. He stressed that pilot projects demonstrating specific components, like carbon sequestration, are more appropriate for the current state of the Hydrogen Initiative. He also emphasized that increasing the focus on basic science and technology development is the most sensible way to advance the technologies needed to succeed with the Hydrogen Initiative.

4.1(w)—Perspectives on the President's Vision for Space Exploration

March 10, 2004

Hearing Volume No. 108–45

Background

On March 10, 2004, the Science Committee held a Full Committee hearing on *Perspectives on the President's Vision for Space Exploration.* Non-governmental witnesses were called on as outside experts on the purpose, structure, costs and challenges of the program, with a special focus on the physiological obstacles to long-term human survival on the Moon and Mars. The hearing supplemented the hearing held on February 12, 2004 (House Science Committee hearing on the *U.S. Vision for Space Exploration*).

Witnesses for the hearing were Mr. Norman Augustine, former Chief Executive Officer of Lockheed Martin and Chair of the Advisory Committee on the Future of the U.S. Space Program; Dr. Donna Shirley, Director of the Science Fiction Museum and former Manager of the Jet Propulsion Laboratory's Mars Program and Assistant Dean of the University of Oklahoma Aerospace Mechanical Engineering Department; Dr. Michael Griffin, President of In-Q-Tel and former Chief Engineer and Associate Administrator for NASA; Dr. Lennard Fisk, Chair of the Space Studies Board of the National Academy of Sciences and of the University of Michigan Department of Atmospheric, Oceanic, and Space Sciences and former Associate Administrator of NASA's Space Science and Applications Department; and Dr. Larry Young, the Apollo Program Professor at the Massachusetts Institute of Technology and Founding Director of the National Space Biomedical Research Institute.

Summary of Hearing

Members expressed support for the spirit of the President's initiative, but in their opening statements, both Chairman Boehlert and Ranking Democrat Bart Gordon were skeptical of the particulars of the plan. Members focused their questions on the budget, timeline, and structure of the proposal, and on our ability to ameliorate the physiological effects of human space flight on the human body.

Witnesses disagreed about the necessity of using the Moon as a "stepping stone" to Mars. Dr. Fisk, who supports that component of the President's plan, said, ". . .[T]he Moon appeals to me for the simple reason that we have an opportunity to go there and try out some of our technical solutions on the way and decide whether they are going to be adequate." Dr. Shirley argued, however, that ". . .there is almost no commonality between Mars and the Moon. . .to justify the vast expenditure that it would take to make the Moon a viable stepping stone."

Witnesses used the International Space Station—which they described as an unfocused mission that has been, on the whole, a disappointment to both scientists and the public—as a cautionary example against building infrastructure for its own sake. At the same time, some witnesses said that the Space Station holds promise as a human space flight training center. In his statement, Dr. Griffin disagreed, however, saying, "It is beyond reason to believe that ISS can fulfill any set of objectives for space exploration that would be worth $60 billion remaining to be invested in the program."

Regarding the physiological hurdles to long-term human survival in space, Dr. Young said that exposure to radiation "remains the most vexing and difficult issue," more difficult to solve than the problems of deconditioning and bone loss, which can be partially mitigated by exercise.

Witnesses also argued that the traditional "manned vs. robotic" dichotomy of space exploration was outdated. "It is no longer a question, in the minds of most of us in the community, of human versus non-human exploration," said Dr. Young. "The question is how do you use robots in conjunction with human exploration."

Witnesses also expressed concern that, even if NASA's space and Earth sciences budget stays steady throughout the new exploration initiative, research areas not directly applicable to solar system exploration may suffer: ". . .[T]here is a sort of science versus science part of this where the science which is directly related to the exploration initiative, particularly the solar system exploration and parts of the Origins Program and so on, are prospering, because they are an integral part of this," said Dr. Fisk.

4.1(x)—H.R. 3970, Green Chemistry Research and Development Act of 2004

March 17, 2004

Hearing Volume No. 108–47

Background

On Wednesday, March 17, 2004 the House Science Committee held a hearing to examine federal and industry green chemistry research and development (R&D) activities, and to receive testimony on H.R. 3970, the *Green Chemistry Research and Development Act of 2004.* This bill would authorize an interagency federal green chemistry R&D program.

The witnesses were: (1) Dr. Arden Bement, Acting Director, National Science Foundation; (2) Dr. Paul Gilman, Assistant Administrator for Research and Development, Environmental Protection Agency; (3) Dr. Berkeley Cue, Vice President of Pharmaceutical Sciences, Pfizer Global Research and Development; (4) Mr. Steven Bradfield, Vice President of Environment Development, Shaw Industries, Inc.; and (5) Dr. Edward Woodhouse, Associate Professor of Political Science, Department of Science and Technology Studies, Rensselaer Polytechnic Institute.

Summary of Hearing

Both Administration witnesses said they supported the intent of the legislation, and looked forward to working with the committee on this issue, but could not support the bill itself. They were concerned with the unintended consequences of codifying an R&D program. Dr. Bement testified that NSF is already meeting the R&D goals of the bill and, specifically, that:

- The National Science Foundation (NSF) currently spends $13 million through the Division of Chemical and Transport Systems and $11 million through the Division of Chemistry on green chemistry activities. These monies support individual investigators, teams of investigators, and research centers.
- NSF currently partners with the Environmental Protection Agency (EPA), Department of Energy (DOE), and the National Institute of Standards and Technology (NIST) to leverage its green chemistry investments.
- NSF supports green chemistry research into chemical synthesis, catalysis, separations research, and environmental research.

Dr. Gilman testified that green chemistry and engineering represent the kind of science on which EPA is focusing to move to the next level of environmental and human health protection. He added:

- EPA is building interest in green chemistry and engineering in future generations through programs like the P3 Award competition, and is launching a new web portal to organize their programs.

- The joint NSF/EPA Technology for a Sustainable Environment (TSE) program has resulted in 347 articles, 25 book chapters, six patents, and one Nobel Prize for Chemistry from the first 64 TSE grants alone.
- EPA is also implementing a new research framework that includes green chemistry and engineering. They are releasing solicitations in the area of Collaborative Science and Technology Network for Sustainability, and will be partnering with states, local governments, and industry to address high-priority challenges.

Dr. Cue described green chemistry as a win-win for Pfizer's goal of achieving economic, environmental, and social sustainability. In addition, he stated that:

- Pfizer has achieved tremendous gains in efficiency through application of green chemistry in the production of pharmaceuticals. Pfizer has seen a 5-10-fold decrease in the amount of waste produced per kilogram of pharmaceutical product (from 25–100 kg to 5–10 kg).
- Few students who are graduating with chemistry majors are trained in or even exposed to green chemistry. Pfizer is investing a huge amount of energy in educating its scientists about the green chemistry principles and how they apply to daily R&D efforts. Dr. Cue believes that H.R. 3970 will help in this respect.

Mr. Bradfield testified that customer demand and profitability are the ultimate drivers of green chemistry adoption in industry, and that applying green chemistry processes, like their recyclable carpet tile, in the carpet industry will keep U.S. jobs from going overseas. He also made recommendations for improving the federal green chemistry effort, including:

- Reward those that use green chemistry products and processes with, for example, tax credits.
- The proposed Interagency Working Group should work closely with industry to establish R&D priorities.
- Re-examine federal procurement procedures that might inhibit adoption of green chemistry techniques. For example, requirements that give preference to products that contain recycled content might prohibit adoption of green chemistry products that may contain little recycled content in the first generation products, but might be favorable in the long run.

Dr. Woodhouse stated that economic and professional inertia are the main barriers to adoption of green chemistry, i.e., small price increases prevent industry from selling green chemistry products and universities are not updating their chemistry curricula to reflect green chemistry. He congratulated the Committee for its farsightedness in addressing green chemistry, and made recommendations for improving the federal effort, including tax credits, more rigorous reporting requirements in the bill, and a realignment of funding in the bill to tilt the authorizations more in EPA's favor. Dr. Woodhouse also agreed with Dr. Cue that much more needs to

be done to train future generations of chemists and chemical engineers in green chemistry.

4.1(y)—The 2003 Presidential Awardees for Excellence in Math and Science Teaching: A Lesson Plan for Success

March 18, 2004

Hearing Volume No. 108–48

Background

On Thursday, March 18, 2004, the House Committee on Science held a hearing to examine how the Federal Government can help improve K–12 math and science education. Four secondary school math and science teachers testified before the Committee, each a recipient of the 2003 Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST), the Nation's highest commendation for K–12 math and science educators.

The witnesses were: (1) Mr. Jonathan Roland, Teacher, Perry Hall High School, Baltimore, Maryland; (2) Ms. Gail Bromiley-McGee, Teacher, Carnegie Vanguard High School, Houston, Texas; (3) Mr. Jason Cushner, Teacher, Eagle Rock School and Professional Development Center, Estes Park, Colorado; and (4) Ms. Wendy Ehnert, Teacher, Austin E. Lathrop High School, Fairbanks, Alaska.

Summary of Hearing

Chairman Boehlert opened the hearing by noting that he cares more deeply about pre-college math and science education than any other issue within the Science Committee's jurisdiction. None of the other goals of the Science Committee can be accomplished without trained scientists and engineers, and math and science teachers are critical to prepare our future scientists and engineers. Ranking Member Gordon agreed, adding these teachers will prepare future generations to enter an increasingly complex world.

Mr. Roland, a physics teacher from Baltimore, MD, testified that he cannot "feed" science to his students. He said that his students needed a nose for the truth and he helped them develop the skills they needed to discover it. He went on to suggest the following ways the Federal Government can improve teaching:

- Supply teachers with opportunities to pursue inquiry learning through research experiences and focused training.
- Evaluate new teaching methods to determine which are valuable and should be implemented in the classroom.

Ms. Bromiley-McGee, a biology teacher from Houston, TX, reiterated the importance of the inquiry-based method for teaching science, and she indicated that the hallmark of a good science teacher was someone that inspires intellectual curiosity and growth in his or her students. She made the following comments:

- Even for those students that do not pursue science careers, math and science education is essential. Students may go on

to become voters, consumers, or parents, and they will need a good foundation in math and science.

- Teacher training, recruitment, and retention are some of the biggest issues facing education today. Teachers need to be well-educated and this includes mastery of content and classroom management.
- The Federal Government should serve as a repository for best teaching practices—a place where all teachers can find successful methods to use instead of "reinventing the wheel."
- There needs to be a system of accountability for teachers, similar to what is in place for students. Also, students should have a voice in their teacher's evaluation.

Mr. Cushner, a math teacher from Estes Park, CO, testified that teaching was most effective when it was used to understand the real world. He made the following observations:

- The Federal Government greatly improved math education with curriculum development research projects in 1989.
- There exists today an illiteracy stigma that is not present for those who cannot achieve proficiency in math. It is an obstacle for students and for teachers.
- It is important to hold teachers accountable for their performance, but some of the restrictions in No Child Left Behind are of concern. Some teachers are so burdened by content requirements that they did not have time to effectively teach any of the subjects.
- To encourage teachers, we need more small groups where teachers can share ideas and take control over their professional development.

Ms. Ehnert, a science teacher from Fairbanks, AK, testified that one of the main qualities of a good teacher was a sense of excitement about his or her subject matter. To do this, teachers needed to continue learning themselves, through research opportunities professional development and advancement, and recognition for good performance. She added:

- The National Junior Science and Humanities Symposium and the Intel International Science Fair were great opportunities for students to become involved in research.
- The NSF funded professional development programs (for example, the Project On Leading Alaska's Restructuring in Science (POLARIS) in Fairbanks, AK) that were successful for many teachers.
- Public recognition such as the Presidential Awards for Excellence in Mathematics and Science Teaching, National Board Certification, and Fulbright Teacher Exchange Program were excellent motivators for teachers.

4.1(z)—Bioterrorism Preparedness: People, Tools, and Systems for Detecting and Responding to a Bioterrorist Attack

May 3, 2004

Hearing Volume No. 108–56

Background

On Monday, May 3, 2004, the House Science Committee held a field hearing to receive testimony on state and local preparedness for a bioterrorist attack, on the role of the Federal Government in supporting local efforts to prepare for, detect, and respond to a bioterrorist attack, and on the development and deployment of tools and systems for detecting and responding to a bioterrorist attack.

The witnesses were: (1) Mr. Charles A. Schable, Director, Bioterrorism Preparedness & Response Program, Centers for Disease Control & Prevention; (2) Mr. Samuel H. Turner, Sr., Chief Executive Officer, Shawnee Mission Medical Center; (3) Mr. Richard J. Morrissey, Acting Director of Health, Kansas Department of Health & Environment; (4) Ms. W. Kay Kent, Administrator/Health Officer, Lawrence Douglas County Health Department; (5) Mr. Brad Mason, Division Chief of Special Operations, Johnson County Med-Act; and (6) Dr. Ronald J. Kendall, Director, The Institute of Environmental and Human Health.

Summary of Hearing

Mr. Neugebauer believes that national security is the most important issue facing the Nation, and that public health professionals are a key part of our national defense. They are responsible for detecting, investigating, and combating bioterrorism events. However, they need adequate tools, systems, and support from all levels of government to fulfill their responsibilities. Mr. Moore, in whose district the field hearing took place, noted the importance to homeland security of regional coordination and lauded the improvements he has witnessed in his district in this respect. He also observed that being prepared to respond to a biological attack improves public health in general because it also increases the ability to respond to naturally-occurring outbreaks of infectious diseases.

Mr. Schable testified that a strong working relationship between federal, state, and local public health officials and law enforcement officials is an integral part of a robust public health system. He said he witnessed this kind of relationship in the Kansas City area in 2001 as part of the anthrax investigations. He also feels that the best strategy against disease is to have a developed, organized disease detection system with the personnel and tools to support it. He went on to testify that:

- In 1999, CDC began a program of providing technical assistance and funds to state, local, and territorial public health departments to improve their ability to respond to a bioterrorist attack. Congress appropriated a substantial increase in funds for this program in FY 2002. The program now helps 62 grantees develop critical public health preparedness capacities.

- Clinicians are the first line of defense against disease outbreaks in the public health system. Their ability to quickly recognize and identify symptoms of an unusual illness has been instrumental to CDC's ability to combat infectious disease outbreaks.
- The CDC's Public Health Information Network will help integrate the information systems of State and local public health agencies. The sharing of data will optimize the effective use of existing public health data.
- The recently announced biosurveillance initiative is an interagency effort to monitor aspects of the food supply, environment, and human health to more rapidly detect public health emergencies.

Mr. Turner testified that the threat of bioterrorism is one of the most difficult challenges a hospital can face, and one of the most frightening for hospital administrators. Bioterrorism attacks can happen at any time and affect any number of people. These uncertainties present many difficulties for hospitals trying to prepare for such attacks. He added:

- Shawnee Mission Medical Center needs several design modifications and additional facilities to be prepared for a mass casualty event. Such modifications include a long hospital access road to be able to detect incoming threats, improved air handling systems to isolate air flows, and a stockpile of the vaccines, antibiotics, and other supplies needed to be self-sufficient for 48–72 hours.
- HealthSentry, a specialized software package for tracking data, distributes public health data to health officials two to three days faster than they would normally receive it. Combined with the vigilance of front line health care providers, this can lead to the rapid identification of a health emergency and a reduction in the potential loss of life.
- Federal guidelines and best practices are needed to help local communities with disaster planning.

Mr. Morrissey testified that the Kansas Department of Health and Environment has worked closely with local health departments and the Kansas Hospital Association to develop and implement Kansas's bioterrorism program. Over $6 million of the program's total $17 million budget is being given directly to local health departments to implements this plan. He added:

- Kansas's bioterrorism program has focused heavily on technology. For example, they developed a secure web-based automated disease reporting system called HAWK, which is used in 36 counties covering 90 percent of Kansas's population. They also developed the Public Health Information Exchange (PHIX). This is a two-way web- and pager-based communication system that sends alert messages to public health and law enforcement officials. Finally, the Kansas Public Health Library was upgraded to biosafety level 3, which means it can now return test results on biological agents more safely, securely, and rapidly.

- The Governor of Kansas has placed an emphasis on coordinating homeland security efforts to reduce duplication of efforts and to work towards the highest possible level of preparedness at the state and local levels.

Ms. Kent testified that Douglas County, Kansas has worked to integrate bioterrorism detection with existing public health systems because the capacities needed to respond to a bioterrorist attack are the same as those needed to respond to all public health hazards. To illustrate this point, she described a natural outbreak of Cryptosporidium that occurred in Kansas in 2003 and the roles local, State, and federal agencies played in response. She added:

- Federal funds are used primarily for staffing, training, and infrastructure needs. They also go towards providing surge capacity in the area of personnel. However, the Kansas Department of Health and Environment still does not currently have the staff necessary to combat two disease outbreaks simultaneously.
- Federal funds have been essential to the progress made in preparedness for, and response to, public health emergencies, and they are needed to maintain readiness at the local level.

Mr. Mason serves as Chairman of the Mid America Regional Council Emergency Response Committee (MARCER), which among other things, provides voice communications infrastructure that links EMS providers in the field with hospital physicians. He testified that:

- Internet-based communications are becoming common in the metro Kansas City area. EMSystem®, a web-based rapid messaging system, is used by EMS providers, hospitals, and public health officials to increase communications. Its success led to its adoption statewide by Missouri and it is being considered for statewide use by Kansas as well.
- Early detection of an outbreak is essential. First Watch® is a computer program that searches for spikes in EMS call activity and notifies public health officials of unusual fluctuations. More detailed surveillance could occur if more information about patients, such as patient records, were able to be searched as well.
- Federal funding from programs like the Department of Homeland Security's State Homeland Security Grant Program and the Urban Area Security Initiative has been critically important to public health programs in the metro Kansas City area.

Dr. Kendall is Director of the Institute of Environment and Human Health which participates in the Admiral Elmo R. Zumwalt, Jr. National Program for Countermeasures to Biological and Chemical Threats. The program's purpose is to coordinate research and to provide training programs in cooperation with the Department of Defense to enhance abilities to prevent and respond to biological and chemical threats. He testified that:

- The Institute's research focus areas include modeling and simulating the dispersion of biological and chemical agents in urban and rural environments, studying emerging animal disease threats, and developing next generation sensors to detect biological and chemical agents. This work has involved more than 60 Texas Tech University scientists from a wide range of disciplines.
- The Texas Emergency Analysis and Response Program integrates scientific and technical expertise with computing and communications systems to create an operational capability that will rapidly provide emergency personnel with the accurate information they need to effectively respond to a chemical or biological attack or other emergency.

4.1(aa)—U.S. Commission on Ocean Policy Preliminary Report

May 5, 2004

Hearing Volume No. 108–57

Background

On May 5, 2004, Committee on Science held a hearing on the key findings and recommendations of the Preliminary Report of the U.S. Commission on Ocean Policy. In response to pressures on ocean and coastal ecosystems from increased coastal development, over-fishing, pollution and a confusing patchwork of federal and State legal authorities for ocean and coastal activities, Congress passed the Oceans Act of 2000. The Act required the President to establish a nonpartisan, diverse commission of experts in ocean policy and charged that commission to establish findings and develop recommendations for a new comprehensive ocean policy, including in research and development. The Report is the first comprehensive review of national ocean policy in more than 30 years.

The Committee heard testimony from: (1) Admiral James D. Watkins, USN (Ret.), Chairman, U.S. Commission on Ocean Policy; (2) Dr. Andrew Solow, Director, Marine Policy Center, Woods Hole Oceanographic Institution. Dr. Solow was a member of the U.S. Commission on Ocean Policy Science Advisory Panel Governance Working Group; (3) Dr. Shirley A. Pomponi, Acting Managing Director, Harbor Branch Oceanographic Institution. Dr. Pomponi was a member of the U.S. Commission on Ocean Policy Science Advisory Panel Research, Education and Marine Operations Working Group; (4) Dr. Leonard J. Pietrafesa, Director of External Affairs, College of Physical and Mathematical Sciences, North Carolina State University. Dr. Pietrafesa is chair of the National Oceanic and Atmospheric Administration (NOAA) Science Advisory Board; and (5) Dr. Michael H. Freilich, Associate Dean, College of Oceanic and Atmospheric Sciences, Oregon State University. Dr. Freilich is a member of the National Research Council's Space Studies Board and Chair of that Board's Committee on Earth Studies.

Summary of Hearing

Admiral James D. Watkins, USN (Ret.), began the hearing by providing an overview of the key findings and recommendations in the Preliminary Report of the U.S. Commission on Ocean Policy.

- A National Ocean Council, including the leaders of all ocean-related agencies and chaired by an assistant to the President, should be established in the Executive Office of the President to coordinate federal ocean activities and set national ocean policy.
- A Presidential Council of Advisers on Ocean Policy should be created to provide input and advice from non-federal experts. The federal agency structure should be strengthened to increase effectiveness and minimize redundancies.
- The National Integrated Ocean Observing System, (IOOS) led by NOAA and combining a network of regional coastal observations with an array of open ocean observations, should be implemented to achieve adequate observational and forecasting capabilities for the oceans and coasts.
- To cover costs and supplement existing appropriations and support new and recommended responsibilities, an Ocean Policy Trust Fund should be established.

Dr. Andrew Solow discussed the Report's recommendations to establish a National Ocean Council to coordinate federal efforts with respect to oceans.

- The main deficiency in federal ocean and coastal policy is fragmentation, which tends to impede policy coordination. However fragmentation is not, by itself, responsible for the problems on the ground and in the water.
- Although the problems in the Nation's oceans and coasts cannot be solved by better coordination alone, a National Ocean Council could contribute to the formulation and execution of better policies and would elevate the visibility of ocean issues in the Federal Government.
- All federal activities relating to the ocean should undergo common policy and budgetary review within the Office of Management and Budget.

Dr. Shirley A. Pomponi provided testimony about the implications of the Report's recommendation for increased funding for ocean research.

- A NOAA organic act should be enacted to clearly lay out an integrated agency structure and mission.
- The overall levels of U.S. investment in ocean research should be doubled to fund such areas as bio-diversity and ecosystem research, development of ocean information systems, climate and ocean modeling, and discovery and development of new marine products. Increases for individual agencies and programs should be based on a careful and comprehensive assessment of national ocean policy and the role of each federal ocean agency in carrying out those priorities.

Dr. Leonard J. Pietrafesa provided testimony on the Report's recommendations to strengthen NOAA.

- At a minimum, there should be an immediate doubling of the federal ocean research budget.
- A NOAA organic act should be enacted so that NOAA can have clear and specific responsibilities assigned to it with an unambiguous partitioning of these responsibilities.
- An end-to-end, integrated Earth-observing measurement system suite for receipt of data in real time should be implemented.

Dr. Michael H. Freilich provided the Committee with comments on the Report's recommendation to transfer some programs from the National Aeronautics and Space Administration (NASA) to NOAA.

- NOAA should be the Nation's lead agency for ocean-related research, education, management, measurements, and predictions that recognizes the equal importance of its research and education, management, and prediction and assessment tasks.
- An interagency coordination group, to address ocean and coastal data and information issues, as well as a Presidential interagency task force to oversee the modernization of the Nation's environmental data and information system, should be established.
- There should be stronger interagency coordination, including moving the Executive's review of NOAA's budget to OMB's Natural Resources Program, to ease the NASA–NOAA transition from research to operations.

4.1(bb)—H.R. 4107, Assistance to Firefighters Grant Reauthorization Act of 2004

May 12, 2004

Hearing Volume No. 108–58

Background

On Wednesday, May 12th, 2004, the House Science Committee held a hearing to examine the Assistance to Firefighters Grant Program and to receive testimony on H.R. 4107, the *Assistance to Firefighters Grant Reauthorization Act of 2004.*

The witnesses were: (1) Honorable Bill Pascrell, Member, U.S. House of Representatives; (2) Mr. R. David Paulison, Administrator, United States Fire Administration (USFA); (3) Mr. Andrew Mitchell, Deputy Director, Office of Domestic Preparedness (ODP), Department of Homeland Security (DHS); (4) Mr. James M. Shannon, President and CEO, National Fire Protection Association (NFPA); (5) Chief Philip C. Stittleburg, Chairman, National Volunteer Fire Council (NVFC); (6) Chief Ernest Mitchell, President, International Association of Fire Chiefs (IAFC); (7) Mr. Kevin O'Connor, Assistant to the General President, International Association of Fire Fighters (IAFF); and (8) Honorable Steny Hoyer, Member, U.S. House of Representatives.

Summary of Hearing

Chairman Smith opened the hearing by stating that the *Assistance to Firefighters Grant Reauthorization Act for 2004* improves upon a program that has been working very well over the past three years. He expressed hope that the legislation would pass allowing this program to successfully continue. Ranking Member Gordon added that he hopes this program will increase funding, services, and equipment for firefighters.

Representative Pascrell explained what the FIRE Act, which he introduced in 1999, has done for our fire departments and how the new legislation would improve upon it. The FIRE Act has distributed over $1.1 billion in funding to fire departments across the country to purchase necessary equipment like fire engines, personal protective equipment, and breathing apparatus. H.R. 4107 reauthorizes the grant program and improves on it by doing the following:

- Scales the size of grants awarded allowing larger departments to receive more funding than smaller departments.
- Reduces the matching requirement of communities from 30 percent to 20 percent to reduce the burden on communities with smaller budgets.
- Transfers the jurisdiction of the program from ODP to USFA.

Mr. Paulison testified that the U.S. has one of the highest death rates due to fire of any industrialized nation and the mission of USFA is to reduce this rate and the rate of property losses as well. USFA accomplishes this through advocacy, coordination of the fire prevention groups, and other training, education, and research programs. He added:

- The fire grant program over the past three years has provided a tremendous amount of equipment and training and has supported educational programs across the country. Each year they receive more than 20,000 applications from fire departments for the grants.
- The peer review process for ranking fire grant proposals has been a tremendous success—it should be not be modified, but rather continued as is.
- In response to the 2003 DHS Inspector General (IG) report, USFA has already implemented some changes and will continue to work with ODP on implementing the recommendations made by the IG.

Mr. Andrew Mitchell expressed DHS's strong support for the reauthorization of the Assistance to Firefighters Grant Program. ODP has worked extensively with USFA to make the transition of the grant program from USFA into ODP go smoothly, and Mr. Mitchell promised to continue that collaborative effort in the future to ensure the success of the program. He testified further that:

- DHS supports the location of the program in ODP under the reorganization as proposed by Secretary Ridge.
- ODP has worked hard to improve the grant application process. The application materials are now available online and

CD–ROMs are also available for fire departments that contain pertinent information on the application process. In addition, ODP and USFA hold local workshops for fire departments across the country on the application process.

- The 2004 program will provide funding in three areas: (1) firefighting operations, safety, and personal protective equipment, (2) fire prevention, and (3) firefighting vehicles. The vast majority of requested funds are under the first category.
- They have received grant applications from all types of fire departments including all volunteer, all paid, and combination departments.

Mr. Shannon stated that the reauthorization of the Assistance to Firefighters Grant Program is essential to the effectiveness of fire service in the U.S. as it addresses every element of fire service. Mr. Shannon asserted his strong support for H.R. 4107 and stated:

- Since 2001, the program has provided almost $2 billion in financial support, although the departments themselves have requested over $9 billion. The needs of the departments are not being fully met, but the new program will continue to strive towards that goal.
- In the next few months, the NFPA will release a needs assessment report on every state to demonstrate how much support fire departments in each state require.
- The Federal Government must continue to provide adequate resources through the program and to support our firefighters.

Chief Stittleburg also voiced his support for H.R. 4107 noting that it continued all of the important aspects of the original legislation, including the peer review process, and added some improvements, for example language that prevents discrimination against volunteer firefighters. He went on to say that:

- Firefighters, both paid and volunteer, respond to various calls, from structural and wildland fires to search and rescue missions, and this bill helps them to be properly trained and equipped.
- Much of our infrastructure is protected in rural areas by volunteer departments and, therefore, the volunteer departments should not be discriminated against. Volunteer firefighters save the country approximately $40 billion a year because of their services.
- Because this bill changes the limits that departments could apply for, the NVFC anticipates a shift of applications from the volunteer sector to the paid sector. Nevertheless, the NVFC still supports this bill because it has proven to be effective as it delivers the money straight to the fire departments.

Chief Ernest Mitchell also offered his support for H.R. 4107 on behalf of the IAFC. He described the grant program as one of the most important relationships between the fire service and the Federal Government. He testified that:

- There are five good reasons for the program's success: (1) funds go directly to local fire departments, (2) grants are awarded on a competitive basis and not on a predetermined formula, (3) grant applications are peer reviewed by knowledgeable fire service people, (4) grants do not supplant local funds, and (5) grants require a co-payment by the community.
- IAFC has three concerns with the program: (1) local control is being eroded away due to ODP's focus on terrorism response instead of all-hazards response, (2) providing financial assistance to volunteer EMS agencies should not be done through this program since it is meant to assist fire departments, and (3) the anti-discrimination clause should also not be part of this program.
- The IAFC does support the provision to move the program back within the jurisdiction of the USFA.

Mr O'Connor testified that IAFF encourages a reauthorization of the FIRE grant program but cannot support H.R. 4107 due to the anti-discrimination language that it contains. He testified that:

- IAFF applauds increasing the maximum grant award to $3 million and reducing the matching requirement from 30 percent to 20 percent because these changes will help larger jurisdictions.
- IAFF has been lobbying to secure collective bargaining rights for firefighters. The anti-discrimination language contained in this legislation proposes limiting these rights, which IAFF strongly opposes.

Representative Hoyer commended Chairman Boehlert on his leadership and focused his remarks on two specific issues: (1) the grant program and expanding eligibility to include separate, nonprofit EMS squads and (2) transferring of jurisdiction back to USFA. He testified that:

- Currently, EMS departments that are a part of local career or volunteer fire departments are eligible for funding, whereas EMS departments that are a separate entity are not. These separate departments, which make up a small percentage of all departments, should be eligible and the reauthorization allows this.
- There is concern that under the jurisdiction of ODP the program might focus on homeland security needs instead of preparing fire departments for all hazards. Shifting the jurisdiction back to the USFA would alleviate these concerns.
- Mr. Paulison should be commended for the outstanding job he has done and transferring the program back to his jurisdiction would practically guarantee the needs of firefighters would be met.

4.1(cc)—H.R. 4218, High-Performance Computing Revitalization Act of 2004

May 13, 2004

Hearing Volume No. 108–55

Background

On Thursday, May 13, 2004, the House Science Committee held a hearing to examine high-performance computing and networking research and development activities and to receive testimony on H.R. 4218, the *High-Performance Computing Revitalization Act of 2004.* This bill would amend the *High-Performance Computing Act of 1991* by directing the President to implement a High-Performance Computing Research and Development Program.

The witnesses were: (1) Dr. John H. Marburger, III, Director, White House Office of Science and Technology Policy; (2) Dr. Irving Wladawsky-Berger, Vice President for Technology and Strategy, IBM Corporation; (3) Dr. Rick Stevens, Director, Mathematics and Computer Science Division, Argonne National Laboratory; and (4) Mr. Daniel A. Reed, William R. Kenan, Jr. Eminent Professor, University of North Carolina at Chapel Hill.

Summary of Hearing

Dr. Marburger conveyed the Administration's support for H.R. 4218 in its current form. He added that the Administration is committed to networking and information technology R&D, which supports many of the President's priorities: winning the war on terrorism, strengthening the economy, and securing the homeland. He went on to testify that:

- OSTP created the High-End Computing Revitalization Task Force under the National Science and Technology Council to develop a forward-looking plan for federal high-end computing. Dr. Marburger presented the report, "Federal Plan for High-End Computing," to the Committee at the hearing.
- The report includes roadmaps for investments in R&D areas including hardware, software, and systems. It also recommends that leadership class high-end computing systems be managed as national resources for all relevant agencies and operated as open user facilities.
- Implementing the recommendations of the report will require a dedicated effort by all the participating agencies, and OSTP is committed to facilitating this effort.

Dr. Wladawsky-Berger made several points concerning global competitiveness and the role of governments in supercomputing. For example, he believes that supercomputers are more important to the IT industry now than they have ever been. He added:

- Supercomputers are essential to overall U.S. leadership in a global marketplace due to the increasing importance of Grand Challenge applications such as building more energy-efficient cars and airplanes and designing better drugs.
- Current efforts of federal civilian agencies in high-performance computing are useful, but must be expanded to meet

present demands and increase the efficiency of key applications in a cost-effective manner.

- IBM's high-performance computing research is directed towards developing advanced microprocessors for use in scalable applications and developing technologies to overcome obstacles to high degrees of parallelism.

Dr. Stevens stated that high performance computing is a critical component to scientific progress, especially within the realm of medical science. Current efforts of civilian science agencies are in the right direction but are inadequate. Demand for high-performance computing is now three times the established capacity. He added:

- Emerging economies will eventually exceed the United States in the number of registered scientists. Therefore, to remain globally competitive, we must improve productivity and efficiency by extending our leadership in high-performance computing and applying it to other areas of research.
- The Department of Energy (DOE) and the National Science Foundation (NSF) should work together to develop and deploy leadership class high-performance computing systems that span a range of architectures. Vendors should focus on developing products that balance price and performance against applications specificity.
- Research should be targeted at four major goals: (1) developing multiple generations of new systems, (2) creating systems software to make next-generation systems usable, (3) developing next-generation environments for scientific problem solving, and (4) investing in fundamental research.

Dr. Reed agreed with the rest of the panel that more research, funding, and development regarding high-performance computing are essential to U.S. global competitiveness in this arena. Specifically, he recommended that:

- H.R. 4218 should also include mechanisms to aid the transfer of promising technologies to commercial practice.
- The NSF should continue its research and development of advanced systems, new architectures, software, tools, and algorithms. Concurrently, it should support computing and data management systems, especially to support its Major Research Equipment projects.
- The DOE should lead advanced prototyping and deployment of high-performance computing systems in conjunction with its scientific facilities and laboratory missions. This advanced development effort would foster the transition of basic research results from the DOE and NSF portfolios into deployed high-performance computing systems.

4.1(dd)—Transportation Research and Development: Applications and Opportunities in the Denver Region

June 4, 2004

Hearing Volume No. 108–62

Background

On June 4, 2004, the Committee on Science held a field hearing on Transportation Issues in Broomfield, Colorado, with a focus on Research Applications and Opportunities in the region of Denver.

The Committee heard testimony from: 1) Mr. Guillermo V. Vidal, Manager of Public Works in Denver; 2) Mr. Jayson Luber, Helicopter News/Traffic Reporter for the Denver radio station KOA; 3) Mr. Carlos Hernandez, transportation planner, Charlier Associates; and 4) Dr. JoAnn Silverstein, Chair of the Department of Civil, Environmental & Architectural Engineering at the University of Colorado.

Summary of Hearing

Mr. Guillermo V. Vidal provided testimony identifying concerns and providing suggestions regarding the Denver transportation system.

- One roadblock to improving Denver traffic congestion is the presence of several different agendas. The State Department of Transportation focus is on quickly moving people from point A to point B, but perhaps at the expense of land use decisions. Transit agencies fight with competing highway interests. Cities and counties value mobility and congestion relief but will not support transportation decisions that sacrifice the quality of life of their neighborhoods or destroy their businesses.
- We need to establish congestion performance measures that can help articulate goals to be achieved in congestion relief, and that reflect the movement of people and goods as opposed to only the movement of cars and trucks.
- Methods to better integrate transit and highway planning should be implemented.
- We could provide incentives for businesses to encourage their employees to change their traveling patterns during peak periods and we need more evaluation to determine the success of toll roads and hot lanes that have been established.

Mr. Jayson Luber provided testimony concerning possible solutions to the Denver traffic congestion problem.

- Although there have been significant improvements in the Metro Denver area, such as the T–REX Project along I–25, the expansion of E–470, and improvements of I–25 along the North, South, and up into the mountains, congestion from Denver to Vail is still a serious problem.
- A monorail is the wrong solution to the Vail traffic problem, because the majority of passengers would be tourists to ski areas, not residents or travelers clogging up I–70 on Satur-

days and Sundays. Instead, the best solution is to expand I–70 to at least three lanes at each direction and possibly expand Highway 285 between Bailey and Fairplay, and Highway 9 between Fairplay and Crisco.

- We should examine the possibility of getting traffic through the Moffat tunnel, linking Boulder County to Grand County without traffic having to go over I–70 in Berthoud Pass to get up to Winter Park and Fraser Valley.

Mr. Carlos Hernandez provided testimony about transportation research regarding the relationship between pedestrians and traffic.

- Because pedestrian traffic has not been studied at the level that roadway capacity and vehicular traffic has been documented in the past 50 years, we need to understand what mobility options are available for other roadway users and develop a clearinghouse to enable engineers and planners to integrate bicycle, pedestrian, and transit in the communities.
- Preliminary studies show a correlation between the obesity rate unavailability of sidewalks or bike paths. Improvements to sidewalk, path, and trail infrastructure may affect people's ability to be more active.
- The design of suburbs have limited peoples access to transit options and caused further congestion.
- There should be further research of "The Walkable Communities," a concept that will have a big impact on the exurbs, the suburbs, and in downtowns all over the country. Current efforts to implement these communities seem to lack credible research.

Dr. Joann Silverstein provided testimony about transportation research at the University of Colorado and addressed emerging issues on transportation systems in Colorado and throughout the western United States.

- Infrastructure project costs are generally underestimated, and the impact of cost estimation errors can be high, with projects cut, scaled back, or even cancelled. Causes of inaccurate cost estimation are numerous, including the complexity of human organizational, technical, and natural resources involved, unforeseen requirements for environmental litigation, and societal and political challenges such as right of way determination.
- Air pollutants and greenhouse gases emitted during vehicle manufacture, manufacture of steel, concrete, asphalt roadway construction, and vehicle use is considered to be the most significant impact of transportation systems and is the subject of significant research at the University of Colorado.
- There is a need to advance research beyond traditional technology to foster interdisciplinary approaches combining engineering, economics, and social science.

4.1(ee)—The Assistance to Firefighters Grant Program: A View From Upstate New York

June 21, 2004

Hearing Volume No. 108–63

Background

On Monday, June 21st, 2004, the House Science Committee held a field hearing to examine the Assistance to Firefighters Grant Program (AFGP) and its impact on the fire departments of upstate New York. The hearing also considered legislation (H.R. 4107, the *Assistance to Firefighters Grant Reauthorization Act of 2004*) introduced by Chairman Boehlert to authorize continued funding for the AFGP through fiscal year (FY) 2007.

The witnesses were: (1) Mr. R. David Paulison, U.S. Fire Administrator and Director of the Preparedness Division, Emergency Preparedness & Response Directorate/FEMA, Department of Homeland Security; (2) Mr. Michael Quill, Chief, Auburn, New York Fire Department; (3) Mr. Brian McQueen, Chief, Whitesboro Volunteer Fire Department; (4) Mr. David Perkins, Training Officer, Aurelius Volunteer Fire Department; and (5) Mr. Pat DiNonno, Director, Office of Emergency Management and Fire Coordinator, Cayuga County, New York.

Summary of Hearing

Chairman Boehlert opened the hearing in his home district by saying that there are few issues he places a higher priority on than providing firefighters and other first responders with the equipment they need. He believes the AFGP has been instrumental in making that possible. Mr. Miller added that AFGP has been very important to fire departments in his own district as well, and he wanted to know from the witnesses how the grant program is working, what impact it has had, and what recommendations they may have as the program moves forward.

Mr. Paulison was unable to be present at the hearing due to airline delays but delivered his testimony via telephone. As USFA Administrator, Mr. Paulison believes that he can help the fire services best by (1) providing leadership for the fire services, (2) reaching out to Congress and the White House on issues important to firefighters, and (3) coordinating firefighter issues. He added:

- AFGP has been tremendously successful. To date it has awarded over 16,000 grants nationwide and given out almost $2 billion to the fire services. Department of Homeland Security (DHS) Secretary Ridge has proposed moving all first responder grants into the Office of Domestic Preparedness in DHS in order to centralize the grants in a one-stop shop.
- Training is one of the primary missions of USFA. In the 1990s the Fire Academy only had about 4000 students per year on campus. Last year there were over 17,000, not including the 30–40 percent of applicants that had to be turned away for lack of space, and this year they have reached over 185,000 students through distance learning programs.

- One example of the distance learning programs is the integrated emergency management course. This course brings together fire chiefs, police chiefs, public works directors, and city managers to teach them how to operate as a team to handle emergencies.
- To focus on reducing the losses of life and property, USFA administers the Babies and Toddlers campaign, which focuses on children under five and adults over 65 who are most vulnerable, and the National Residential Sprinkler Initiative, since sprinklers have been so successful at preventing losses of life.

Chief Quill, whose Auburn Fire Department hosted the hearing, testified that AFGP is one of the most important programs for the fire services as it gives firefighters the tools they need to do their jobs. He also applauded the competitive nature of the grants and that they go straight to fire departments and not through another layer of bureaucracy. He went on to say:

- Last year the Auburn Fire Department used one of the grants to purchase self-contained breathing apparatus (SCBA) and radios, which are necessary for firefighter safety. However, they still need to replace vehicles that may soon become more expensive to repair than to replace.
- Personnel at the Auburn Fire Department have had very positive experiences with DHS training courses with 33 personnel logging over 1700 hours of training.
- Cayuga County has formed a consortium of first responders to provide high quality, engaging training and education for first responders to prepare them for all types of emergencies. Cayuga County Community College is a leader in this consortium.

Chief McQueen is Chief of an all volunteer fire department that serves Whitesboro, a community of approximately 14,000 residents that covers about 5000 square miles. His department provides support to the community for all types of hazards. It has 55 personnel, but he sees few young people interested in joining the firefighting ranks. He also testified that:

- His department has had only limited success in applying for grants, receiving only one award in four tries. However, he feels that the FEMA grant staff was very effective at helping him carrying out that grant, which was used to purchase self-contained breathing apparatus.
- The volunteer non-discrimination language in H.R. 4107 is necessary because professional firefighters that volunteer with other fire departments improve the fire protection and education of the volunteer departments.
- Making EMS squads not affiliated with a fire department eligible for grants, as included in H.R. 4107, is also an improvement on the grant program. This will benefit the communities they serve and the fire departments, who often are called upon to respond to medical calls themselves.

Mr. Perkins believes AFGP is one of the most beneficial steps the Federal Government has taken in recent years to assist emergency responders. He emphasized that State and local governments also have a responsibility to help their first responders. He added:

- The Aurelius Fire Department was successful in obtaining a grant in 2003 that they used to upgrade their breathing apparatus to current standards (which also allows for improved inter-operability with other departments) and upgrade their communications equipment.
- More and more demands are being place on fire departments, including volunteer departments, while at the same time fewer people are able to dedicate their time to volunteer services. Without AFGP to bolster the department, the Aurelius Fire Department would not have been able to make these upgrades for many years, if at all.
- Whether or not a department receives a grant, the process required to prepare the grant improves the department's operations and preparedness because they must examine their day-to-day operations and how the requested equipment would benefit theirs and other departments.

Mr. DiNonno testified that the purchasing and maintaining of training equipment and supplies is a very expensive part of training programs. He also noted that there is a need to upgrade outdated communications equipment, which does not perform well in the topography of upstate New York. AFGP can provide assistance on both of these accounts. Mr. DiNonno also supports the addition in H.R. 4107 of language that extends fire grants to EMS services that are not affiliated with fire departments.

4.1(ff)—Cyber Security Education: Meeting the Needs of Technology Workers and Employers

July 21, 2004

Hearing Volume No. 108–68

Background

On Wednesday, July 21, 2004, the House Committee on Science held a hearing to review efforts by academia, industry and government to develop a cyber security workforce.

The witnesses were: (1) Mr. Chet Hosmer, President & CEO, WetStone Technologies, Inc.; (2) Mr. John Baker, Director of Technology Programs, Division of Undergraduate Education, School of Professional Studies in Business and Education, Johns Hopkins University; (3) Mr. Erich Spengler, Principal Investigator, Advanced Technology Education Regional Center for the Advancement of Systems Security and Information Assurance, Moraine Valley Community College; (4) Second Lieutenant David Aparicio, Electrical Engineer, Air Force Research Laboratory Information Directorate; and (5) Ms. Sydney Rogers, Principal Investigator, Advanced Technology Education Regional Center for Information Technology, Nashville State Community College.

Summary of Hearing

Chairman Boehlert opened this hearing by noting that cyber security has been a focus of the Committee over the past two years. He stressed that information and communication systems are part of practically every aspect of our lives, yet are vulnerable to attacks and invasions. Business and industry are recognizing the need to invest in technology and the training of professionals in computer security and information assurance; however, education and training programs are still in the development stage. He stated that we must continue to increase the quality and quantity of cyber security education and training to enhance the protection of our information and communication systems to create a more secure future.

Ranking Member Gordon added that he was particularly interested in learning if the cyber security education programs are focused on industry's requirements, meeting the demand for cyber security professionals, and receiving adequate funding.

Mr. Hosmer described the interactions WetStone Technologies, Inc. has had with various cyber security education programs. Some lessons he has learned as a result of these interactions include:

- Cooperation between the private sector and colleges and universities will help to build and structure these programs.
- Cyber security is an ever-changing field and the program needs to have the flexibility to change on a daily basis.
- Internship programs are also key because practical experience is absolutely essential. Cyber security requires knowledge in both the computer and social sciences, and internships bring the two together.
- Program training is also an essential piece that is very expensive. Many times, individuals are required to pay for their own training despite taking time off their regular jobs. He expressed a need to support these people.

Mr. Baker discussed the undergraduate programs in information systems that he runs at the School of Professional Studies in Business and Education at Johns Hopkins University. He testified that:

- Education and training are separate entities. Training is generally focused on product or a specific set of skills in an area whereas education's goals are to teach specific technology skills, develop critical thinking and problem-solving skills, improve the field knowledge, improve the ability to communicate, and cultivate research interests.
- Money, time, and a good selection process for faculty are all key to program development. A new issue, student background checks, has emerged as it might become necessary to determine the suitability of a student for a certain program.
- The Federal Government can help by (1) including more funding for NSF initiatives, (2) encouraging the development of educational standards, (3) providing scholarship opportunities for potential employees of private industry and State governments, and (4) absorbing graduates of the Scholarship for Service Program.

Mr. Spengler discussed how community colleges are addressing challenges in cyber security education and focusing on the skills necessary to adjust to rapid changes in workplace technology. He stated that:

- Community colleges have a flexible curriculum, allowing them to respond quickly to changes in technology and the needs of the private sector.
- Shortages of qualified applicants for IT security positions indicate significant opportunities for associate's degree holders.
- The greatest challenge for community colleges is faculty development and recruitment. The NSF Advanced Technological Education (ATE) program, established to address this need, has centers and resources available for faculty to be properly trained in security and information assurance.
- The Federal Government must continue to invest in NSF ATE centers in order to continue education of our cyber security workforce.

Lieutenant Aparicio testified about his personal experience in the Advanced Course in Engineering on Cyber Security at the Air Force Laboratory in Rome, New York. According to his testimony, this program:

- Combines project participation with personal mentors and high-intensity classroom instruction to instill technical confidence and mental flexibility to solve any type of problem.
- Addresses the challenge of the National Strategy to Secure Cyberspace by developing students in pre-commissioning officer training programs into future cyber security leaders. Establishing and maintaining leadership is key to the security of our nation.
- Needs the help of the Federal Government in recruiting younger generations and making the public more aware of the issues of cyber security.

Ms. Rogers discussed the needs of employers in the region surrounding the NSF ATE regional center and the importance of contextual learning in cyber security. She testified as follows:

- We need to develop teaching and learning methods that promote learning, thinking, and problem-solving in the context of the real world.
- Model programs have been developed that bring workplace experiences directly to students in the classroom, which creates more adaptable workers and allows for the re-education of current workers. These programs need continued work in faculty development, materials development, and partnerships with the private sector in order for them to have maximum effectiveness.
- Through the NSF ATE program, over 200 faculty and industrial, university, and secondary partners are teaming up at Synergy 2004 to begin plans for educational reform of IT and IT-based programs. Synergy 2004 will hopefully motivate and prepare everyone to implement change in cyber security education.

- The Federal Government needs to continue to support the ATE program and make technological education a national priority.

4.2—SUBCOMMITTEE ON ENERGY

4.2(a)—The Future of University Nuclear Science and Engineering Programs

June 10, 2003

Hearing Volume No. 108–12

Background

On Tuesday, June 10, 2002, the Energy Subcommittee of the House Science Committee held a hearing to examine the future of university nuclear science and engineering programs and how those programs might affect the future of the nuclear power industry in the United States. The hearing built upon H.R. 238, the *Energy Research, Development, Demonstration, and Commercial Application Act of 2003,* which the Science Committee unanimously approved on April 2, 2003. The bill would authorize increased funding to the Department of Energy (DOE) for several university-based programs targeted at nuclear science and engineering.

The Committee heard testimony from: (1) Dr. Gail H. Marcus, Principal Deputy Director, Office of Nuclear Energy, Science and Technology, U.S. Department of Energy; (2) Dr. Daniel M. Kammen, Director of the Renewable and Appropriate Energy Laboratory at the University of California, Berkeley; (3) Ms. Angelina Howard, Executive Vice President of Policy, Planning and External Affairs, Nuclear Energy Institute; (4) Dr. James F. Stubbins, Head of the Nuclear, Plasma, and Radiological Engineering Department at the University of Illinois at Urbana-Champaign, Illinois (UIUC); and (5) Dr. David M. "Mike" Slaughter, Chair of the Nuclear Engineering Program and Director of the Center for Excellence in Nuclear Technology, Engineering, and Research (CENTER), University of Utah.

Summary of Hearing

Dr. Marcus began by introducing a group of students in attendance who were participants of the Washington Internship for Student Engineering (WISE) program. Dr. Marcus emphasized the need to continue funding and expansion of programs at DOE to ensure a knowledgeable workforce into the future. She explained several programs at the Department of Energy (DOE) including Innovations in Nuclear Infrastructure and Education (INIE), the newest DOE university nuclear program designed to encourage partnerships between the public and private sector to expand research opportunities for universities. She also discussed the status DOE grant programs in nuclear engineering. She revealed a new strategy for R&D funding that devotes 5–10 percent of total funds to

universities in an attempt to increase creativity and expertise in research programs.

Dr. Daniel M. Kammen testified to the state of nuclear energy market in the context of renewable fuels and the lack of innovative programs in nuclear engineering programs. He highlighted the importance of diversifying academic programs and stated that overall there is insufficient cross-disciplinary training in nuclear engineering programs. With the exception of Texas A&M, students often aren't offered variety in their curriculum and are often only offered electives like advanced calculus. Dr. Kammen suggested changes in programs that ranged from advising students to pursue advanced degrees in fields other than engineering to altering the accreditation process for undergraduates interested in pursuing a degree in nuclear engineering.

Ms. Howard testified that there is a staffing crisis in the nuclear energy industry. She claimed that our increasing reliance on nuclear energy requires us to increase generation of nuclear power demanding an enhanced workforce. Ms. Howard cited a Nuclear Energy Institute (NEI) study that claimed a need for 90,000 new industry workers by 2011. This study cited the first wave of retirements in the next 3–5 years and far more in 7–10 years. The DOE and General Accounting Office (GAO) have also concluded that there is a growing staff crisis.

Dr. Stubbins, former chair of the Nuclear Engineering Department Heads Organizations (NEDHO), focused on the positive developments in nuclear technology and the positive influence that has on those individuals looking to join the field. He attributed the trend to a refocused national outlook on the importance of nuclear energy.

4.2(b)—Competition for Department of Energy Laboratory Contracts: What Is the Impact on Science?

July 10, 2003

Hearing Volume No. 108–24

Background

On July 10, 2003, the Subcommittee on Energy held a hearing to examine the Department of Energy's (DOE) management and operations (M&O) contracts for its laboratories. Specifically, the hearing focused on DOE's use of M&O contract competition to create accountability for scientific and managerial performance, and on whether the application of competition as a tool to promote accountability has particular implications for the conduct of science at the laboratories.

The relationship between DOE and its laboratory M&O contractors has evolved considerably since the first contracts were set up decades ago. While few observers would deny the success of the science at DOE laboratories, it is also difficult to deny that the pursuit of the laboratories' missions has sometimes come at the expense of normal housekeeping chores that taxpayers, rightfully, expect with the expenditure of their funds. Consequently, the Congress and its oversight committees, Office of Management and Budget, General Accounting Office, and the Inspector General/

DOE, increased their scrutiny of DOE. The DOE, in turn, increased its oversight of laboratory functions.

The Committee heard testimony from: (1) Mr. Robert Card, Undersecretary for Energy, Science and Environment, U.S. Department of Energy; (2) Ms. Robin Nazzaro, Director of Natural Resources and Environment at the General Accounting Office; (3) Dr. Paul Fleury, Dean of Engineering and Frederick William Beinecke Professor of Engineering and Applied Physics at Yale University; and (4) Dr. John McTague, Professor of Materials at the University of California, Santa Barbara.

Summary of Hearing

With the exception of Ms. Nazzaro, whose testimony focused on the management and financial operations of the laboratories, the panelists all praised the success of the laboratories in delivering scientific advances. All the panelists also recognized that in recent years there have been difficulties in the management and operations of the laboratories, and that at some level these are threatening the success of the scientific mission. While Ms. Nazzaro focused on the lack of accountability at the labs and DOE's problems with contract management, Dr. Fleury and Dr. McTague both stressed the partnership and trust dimensions of the Government Owned Contractor Operated (GOCO) relationship and admonished Congress and the Department to "First, do no harm" in implementing new competition policies.

A main line of questions focused on by Rep. Biggert and Rep. Davis was competition itself: Is it necessary and beneficial when the contractor is performing well? Are there enough capable entities to allow a successful competition? Mr. Ehlers and Ms. Woolsey focused on the effect of competition on the scientific staff, urging caution, with which Dr. Fleury and Dr. McTague strongly agreed.

4.2(c)—Keeping the Lights On: Removing Barriers to Technology to Prevent Blackouts

September 25, 2003

Hearing Volume No. 108–23

Background

On September 25, 2003, the Subcommittee on Energy held a hearing to examine the role of technology in preventing future blackouts and the current economic, regulatory, and technical barriers to improve reliability. The hearing also examined the role of the Department of Energy's (DOE) newly established Office of Electric Transmission and Distribution (OETD) in enhancing the power grid's performance and reliability.

On August 14, 2003, the power went out for 50 million Americans. While the precise sequence of events was not yet known, overloading a portion of the Nation's transmission system clearly played an important role that was possibly compounded by human error and unclear lines of responsibility.

The Committee heard testimony from: (1) Mr. James W. Glotfelty, Director of the Office of Electric Transmission and Distribution, U.S. Department of Energy; (2) Mr. T.J. Glauthier, Presi-

dent and Chief Executive Officer of the Electricity Innovation Institute, Electric Power Research Institute (EPRI); (3) Mr. Thomas R. Casten, Chairman and CEO of Private Power LLC; and (4) Dr. Vernon L. Smith, Nobel Laureate, Professor of Economics and Law and the Director of the Interdisciplinary Center for Economic Science at George Mason University.

Summary of Hearing

Chairman Biggert requested Mr. Casten give specific examples of the difficulties his business has encountered in trying to recycle waste heat from large industrial sources (such as steel mills) because of restrictions in access to local lines. Mr. Casten outlined a new pricing paradigm that would reflect the costs of transmission as well as generation to encourage distributed generation (DG). Mr. Glotfelty agreed that distributed generation was important, but warned that even if we optimistically assume we could meet 30 percent of our electricity production needs through DG, we would still need the grid to transmit 70 percent of our electricity. Mr. Glauthier concurred, advocating "smart grid" technologies.

Rep. Lampson asked each of the panelists to identify the three most important, currently available technologies that would do the most for improving the reliability of the grid. There was considerable consensus in the responses, which emphasized the need for high capacity transmission lines, wide-area measurement systems, microprocessor controls, and training of operators in the use of these technologies. When the panel was asked what was deterring efforts to upgrade the grid, they explained that the difficulty lies mainly in cost, and uncertainty relating to allocation of costs and benefits. The wide-area measurement systems are difficult to deploy because they entail sharing information across control areas, and this causes some in the industry discomfort because of proprietary concerns. Each of these technologies is already used to a limited extent on the grid, but the panelists stressed the need for wider deployment.

4.2(d)—What Are the Administration Priorities for Climate Change Technology?

November 6, 2003

Hearing Volume No. 108–35

Background

On November 6, 2003, the Subcommittee on Energy held a hearing to examine the Administration's progress on its climate change technology programs. On June 11, 2001, President Bush announced the creation of two initiatives to address climate change: the Climate Change Research Initiative (CCRI) to address areas of scientific uncertainty, and the National Climate Change Technology Initiative (NCCTI) to support applied research and demonstration projects. At the working level, the CCRI was to be headed by the Department of Commerce, and the NCCTI was to be headed by the Department of Energy. The CCRI has since been renamed the Climate Change Science Program (CCSP), and NCCTI has since been renamed the Climate Change Technology Program (CCTP).

The Administration is significantly behind its own schedule for developing a climate technology research and development (R&D) report to the Congress. Meanwhile, the Administration has been emphasizing three particular long-term R&D efforts as climate-change related: International Thermonuclear Experimental Reactor (ITER), the Hydrogen program and a project related to carbon sequestration. The focus on long-term efforts, rather than more immediately realizable gains available at no cost to the economy, is of concern to the subcommittee. In addition, the project on carbon sequestration raised fundamental policy and budget questions.

The Committee heard testimony from: (1) Mr. David Conover, Director of the interagency Climate Change Technology Program (CCTP), U.S. Department of Energy (DOE); (2) Mr. George Rudins, Deputy Assistant Secretary for Coal and Power Systems, U.S. DOE; (3) Dr. Sally Benson, Deputy Director for Operations, Lawrence Berkeley National Laboratory (LBNL); and (4) Dr. Marilyn Brown, Director of Energy Efficiency and Renewable Energy at the Oak Ridge National Laboratory (ORNL).

Summary of Hearing

The morning of the hearing, DOE delivered a letter from Under Secretary Card along with the first installment of their climate change technologies report. Chairman Biggert asked Mr. Conover to identify the Administration's near-term technology priorities. Mr. Conover responded that the Administration had robust funding for energy efficiency and renewable energy programs.

Dr. Brown testified about the potential of "no regrets" efforts at energy efficiency—investments that make sense even if carbon emissions are not an issue—to contribute to carbon emissions reductions. Mr. Rudins addressed the technical and budget aspects of the Energy Department's plans for a carbon sequestration experiment. Dr. Benson testified about the technical challenges of storing large quantities of CO_2 in geological formations.

Rep. Ehlers pressed Mr. Rudins about the energy penalty and added costs associated with the capture, compression, and storage of CO_2 in the sequestration project. He questioned Mr. Rudins statement that the added costs would be only 10 percent, and suggested it would be closer to 30 percent. Mr. Ehlers noted that nuclear energy might produce carbon-neutral electricity more economically once the costs of capture, compression, and sequestration were included.

Rep. Gingrey asked Mr. Conover how the Administration planned to reduce carbon intensity by 18 percent by 2012. Mr. Conover pointed to voluntary programs, such as EPA's Climate Leaders. Rep. Woolsey asked if voluntary commitments were really sufficient. Dr. Benson replied that, based on discussions with members of the oil and gas industry, voluntary programs were not sufficient. Mr. Conover replied that, since we don't know the long-term effects of climate change, we should couple voluntary programs today with R&D to develop options for the future.

4.2(e)—Review of Non-Oil and Gas Research Activities in the Houston-Galveston-Gulf Coast Area

December 4, 2003

Hearing Volume No. 108–36

Background

On December 4, 2003, the Subcommittee on Energy held a field hearing to review the extensive non-oil and gas energy research that is being conducted in the Houston-Galveston-Gulf Coast area. This part of Texas hosts the highest concentration of the domestic oil and gas industry in the country. However, the area research community is very diversified and has extensive capabilities outside of the oil and gas sector. The hearing outlined the scope of these activities and how current research being conducted in the areas is contributing to advances in energy conservation, efficiency and production.

The Committee heard testimony from: (1) Mr. Todd Mitchell, President; Houston Advanced Research Center; (2) Dr. Richard Smalley, University Professor, Director of the Carbon Nanotechnology Lab, Rice University; (3) Dr. Mark Holtzapple, Professor, Department of Chemical Engineering, Texas A&M University; (4) Robert (Bob) Hennekes, Vice President, Technology Marketing, Shell Global Solutions; and (5) Dr. Franklin Chang-Diaz, Johnson Space Center, National Aeronautics and Space Administration (NASA).

Summary of Hearing

The topics the panel discussed included nanotechnology and "bucky tubes," coal gasification, biomass, and fusion power. Chairman Biggert asked Dr. Smalley to describe his ideas for sustainable energy into the future. Dr. Smalley explained local storage as a crucial component of future electricity supply. Dr. Chiang-Diaz from NASA spoke about the importance of science education, and spoke briefly about the application of ITER research to NASA projects and terrestrial technologies. He also asked that Congress work to improve the coordination between agencies. Others testified about public/private partnerships and non-profit aid crossing the "valley of death" between research and development and commercialization, about new biomass techniques, and advanced combustion engines.

4.2(f)—Priorities in the Department of Energy Budget for Fiscal Year 2005

March 24, 2004

Hearing Volume No. 108–50

Background

On March 24, 2004, the Subcommittee on Energy held a hearing on the Department of Energy's fiscal year 2005 budget request. Five Department of Energy (DOE) witnesses reviewed the proposed research and development (R&D) budgets and clarified the President's energy-related science and technology priorities.

The witness panel included: (1) Dr. James Decker, Principal Deputy Director of the Office of Science, DOE; (2) Mr. David Garman, Assistant Secretary for Energy Efficiency and Renewable Energy (EERE), DOE; (3) Mr. Mark R. Maddox, acting Assistant Secretary for Fossil Energy, DOE; (4) Mr. William D. Magwood, IV, Director of the Office of Nuclear Energy, Science and Technology, DOE; and (5) Mr. James W. Glotfelty, Director of Office of Electric Transmission and Distribution, DOE.

Summary of Hearing

In addition to budget priorities, the Members in attendance at the hearing expressed interest in two issues that cut across the five DOE offices represented: economic development, and education in the physical sciences. Discussion is summarized by office below the discussion of topics.

Economic Development

Mr. Larson asked the panelists about the accessibility of their programs to industry. Mr. Decker said that the Office of Science accepts unsolicited proposals from industry and universities, and that companies often enter into contracts with the national labs. Mr. Garman described efforts to be accessible to industry through the Internet and highlighted the FreedomCAR Initiative. He noted this partnership involves both large businesses (the auto makers) and small businesses (automotive supply companies).

Mrs. Biggert asked Mr. Decker to describe how access to a leadership class computing system could give American businesses a competitive edge. Mr. Decker responded that such machines enable companies to greatly reduce their pre-production costs through advanced simulations known as "virtual prototyping."

Education and Workforce

Larson presented the idea of founding an "energy corps," to encourage students to enter fields important to the energy needs of the country. In response to a question from Ms. Woolsey, Mr. Decker commented that the shortage of U.S. citizens entering the physical sciences is significant but he was encouraged that enrollment in physics is up this year. Mr. Garman talked about the Future Truck program and the opportunity provided to students in vehicle engineering.

Budget Priorities

Mrs. Biggert asked each of the panelists how they would trim their budget if the $750 million for Yucca Mountain is not approved as a stand-alone budget item and has to come off of the top of the E&W appropriations. Garman and Magwood said they would suggest that appropriators first look to earmarks for cutting budgets.

EERE

Dr. Ehlers commented to Mr. Garman on how the EERE budget is going down 4.7 percent, and down 9.9 percent if the Hydrogen FreedomCAR is excluded. Garman conceded that energy efficiency programs had been reduced, and that the Administration made a deliberate decision to fund weatherization programs in lieu of energy efficiency R&D.

Science

Dr. Ehlers also asked about the status of the Rare Isotope Accelerator (RIA) project. Mrs. Biggert asked Mr. Decker what he would do with an increase over his budget request. He said they would push to use their existing facilities at 100 percent capacity, which are at 95 percent overall now.

Mrs. Biggert asked about the 20-year plan and what DOE would do if not fully funded. Decker said the FY05 budget allowed them to start five projects, and the question is one of balance. She asked which of the facilities would be hurt most by delays in funding. Decker said RIA is the largest project, at about $1 billion, and that DOE would delay construction of RIA.

Nuclear

Magwood said he would protect university programs and support to students in nuclear technology fields. Mrs. Biggert turned to infrastructure costs, and asked why nuclear R&D was cut to support infrastructure costs formerly borne by Environmental Management. Magwood said that the nuclear R&D programs were cut for independent reasons and were not offsets for the transition costs of the new lab. Advanced Fuel Cycle Initiative was decreased, for example, because they had made a decision not to pursue a commercial scale demonstration of the developed technologies.

Mr. Larson noted that the country has been wary of nuclear power. Magwood said that there are 103 nuclear power plants operating in the U.S. today, and the Nuclear Regulatory Commission has indicated all of these plants will probably be re-licensed.

Fossil

Dr. Ehlers asked Mr. Maddox why so much money is set aside for FutureGen, when other projects are cut. Maddox said it was important for industry to see that the government's part of the money for FutureGen is on the table, a necessity for getting industry to buy-in.

Electrical Transmission and Distribution

In response to questions from Mr. Ehlers, Mr. Glotfelty described GridWise and GridWorks as programs that work with industry to develop technologies to increase resilience of the grid. Mr. Ehlers

observed that the blackout last summer was not just a technology failure, but also a system management failure. Mr. Ehlers suggested that regional planning alone was not sufficient.

Fuel Cells

Mrs. Biggert asked why distributed generation funding was cut, given the importance of fuel cells to the hydrogen economy. Maddox said the reason was that the technologies that had been under development in that program, like solid oxide fuel cells, had matured. He also noted that the program was discontinued so those technologies could transition over to private sector products. Garman responded that the issue of when to transition a technology out of the lab and into the marketplace is difficult. He noted that stationary fuel cells are in the market today and are used by electricity users who demand extreme reliability.

4.2(g)—The Impact of Federal Energy Efficiency and Renewable Energy R&D Programs

May 19, 2004

Hearing Volume No. 108–59

Background

On May 19, 2004, the Subcommittee on Energy held a hearing to examine the potential contribution of energy efficiency and renewable energy to the Nation's energy needs. The hearing focused on the contributions of the renewable energy and efficiency research and development (R&D) programs at the Department of Energy.

The Committee heard testimony from: (1) Mr. Steven Nadel, Executive Director of the American Council for an Energy-Efficient Economy (ACEEE); (2) Mr. Paul Konove, President of Carolina Country Builders of Chatham County Inc.; (3) Ms. Vivian Loftness, Head of the School of Architecture at Carnegie-Mellon University; (4) Mr. John B. Carberry, Director of Environmental Technology for the DuPont Company in Wilmington, Delaware; (5) Mr. Peter Smith, President of the New York State Energy Research and Development Authority (NYSERDA); and (6) Mr. Daniel L. Sosland, Executive Director of Environment Northeast.

Summary of Hearing

Although some testimony covered energy efficiency and renewable energy topics more broadly, the majority of the discussion was centered around energy efficiency in the building sector. Paul Konove, a North Carolina home builder specializing in custom solar design and construction, spoke about the need for better coordination among federal agencies (including the Department of Energy, Environmental Protection Agency, and Housing and Urban Development) that sponsored outreach programs to builders. There were several back and forth discussions about the possibility of an energy extension service, similar to the agricultural extension service, which would interface with consumers, suppliers, and homebuilders.

Vivian Loftness, who chairs the School of Architecture at Carnegie-Mellon University, explained that some aspects of "green" building design (such as day-lighting and natural ventilation) could yield benefits in both energy efficiency and occupant productivity and health. She cited studies showing that increased use of daylight in buildings improved worker productivity and student learning. She also cited studies correlating increased natural ventilation with lower absenteeism due to sickness. She noted that neither the National Institutes of Health nor the National Science Foundation have lines in their mandates to support research in building design, which makes getting funding for healthy-building design research difficult.

Peter Smith of NYSERDA advocated federal standards for building efficiency that would "level the playing field" across states, but would also allow states flexibility in how they would implement the standards. He said that the State governments need to lead by example, and New York State has done so by establishing a fund to bring building energy specialists into State buildings for energy audits and retrofits. Having a dedicated fund has meant that State agencies don't need to divert money from their regular budgets to improve the energy efficiencies of their buildings.

Mrs. Biggert asked the panel what could be done to get people more interested in "green" building construction. Mr. Sosland described the need to educate the entire "supply chain" of individuals involved in building construction—architects, material suppliers, builders, contractors, and home owners. Mr. Smith said that New York has been successful in this area because it has coupled a media campaign on energy efficient buildings with a certification program for contractors.

In the second round of questions, Mrs. Biggert asked the panel to identify the biggest opportunity—the biggest "bang for the buck"—in the energy efficiency and renewable energy area. Five of the six witnesses cited the need for federal building and appliance efficiency standards. Mr. Carberry of DuPont sited the need for policies to lessen natural gas price volatility.

Mr. Boehlert asked the panel to try to quantify the cost of a 10 percent cut in energy efficiency R&D, and after they answered asked them to take the time to craft a response for the record. Mr. Smith responded that they leverage eight to ten dollars of private sector investment for every dollar invested through their program, and suggested using this multiplier to estimate the lost investment. Mr. Carberry noted that the biggest cost was likely to be lost momentum, and that rebuilding the momentum would likely take a decade.

4.2(h)—An Examination of H.R. 3890, A Bill to Reauthorize the Metals Program at the Department of Energy

May 20, 2004

Hearing Volume No. 108–61

Background

On May 20, 2004, the Subcommittee on Energy held a hearing to examine H.R. 3890, *a bill to reauthorize energy efficiency research and development (R&D) at the Department of Energy (DOE) to support the domestic metals industry.*

The Committee heard testimony from: (1) Mr. Douglas L. Faulkner, Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, Department of Energy; (2) Mr. Richard A. Shulkosky, Vice President for Sales, Marketing, and Product Development, INTEG Process Group; (3) Ms. Lisa A. Roudabush, General Manager of Research, United States Steel Corporation; and (4) Dr. Ronald Sutherland, Consulting Economist and Adjunct Professor of Law, George Mason University School of Law.

Summary of Hearing

The DOE metals efficiency R&D program was originally authorized by the *Steel and Aluminum Energy Conservation and Technology Competitiveness Act of 1988* and reauthorized in the *Energy Policy Act of 1992.* H.R. 3890 reauthorizes the Metals Initiative through Fiscal Year 2009, and makes minor modifications to current law including provisions to: consider the potential of emission-reducing technologies during research planning; repeal an inactive program at the National Institute of Standards and Technology; and reinstate a provision requiring an annual report to the President and Congress.

Chairman Biggert correlated energy efficiency to remaining competitive and keeping production costs low. She also noted that reducing energy use leads to lower emissions, greenhouse gases, and an overall increased energy security. Ranking Minority Member John Larson commended the Metals R&D Program at DOE for ensuring that U.S. manufacturers remain leaders in the world.

Douglas Faulkner characterized the program as a collaborative, cost-sharing venture that brings together public-private research by using the metals industry, the DOE national labs, universities, and states. According to Faulkner, the U.S. steel industry consumes about two quadrillion BTUs of energy per year, which accounts for approximately two percent of all U.S. energy consumption, an energy cost amounting to about 15 percent of the total manufacturing costs for steel. Lisa Roudabush further endorsed reauthorization legislation sponsored by Representative Melissa Hart, saying that the Metals Initiative is the only federal program that cites competitive advantage as a goal. Roudabush explained that developments such as Advanced High Strength Steels can be attributed to the program.

Energy efficiency in the U.S. metals industry was highlighted by Members of the Committee as a policy priority, and was linked to

competitiveness. The Administration did not take a position on the bill, but it did not oppose continued funding.

4.2(i)—Nuclear R&D and the Idaho National Laboratory

June 24, 2004

Hearing Volume No. 108–64

Background

On June 24, 2004, the Subcommittee on Energy held a hearing to examine the Department of Energy's (DOE) plan to establish the Idaho National Laboratory (INL) in 2005 as the lead federal laboratory for nuclear energy research and development (R&D).

The Committee heard testimony from: (1) Mr. William D. Magwood, IV, Director of the Office of Nuclear Energy, Science and Technology (NE), DOE; (2) Dr. Alan Waltar, Director of Nuclear Energy, Pacific Northwest National Laboratory (PNNL); (3) Dr. Robert Long, President of Nuclear Stewardship, LLC; and (4) Dr. Andrew Klein, Chair of Nuclear Engineering Department, Oregon State University.

Summary of Hearing

The purpose of the hearing was to examine DOE's plans to establish the INL in 2005 as the lead federal laboratory for nuclear energy R&D. In general, all witnesses supported the establishment of INL as a lead lab for nuclear research, but felt that it was also necessary to maintain current nuclear energy R&D capabilities (personnel and facilities) at other national labs. Witnesses (except Mr. Magwood) also testified that increased and sustained funding for NE was necessary to maintain a viable NE R&D program and to make INL a world-class lab within 10 years (a stated DOE goal). Most witnesses concurred that INL should be a multi-purpose lab with a focus on nuclear R&D, but with capabilities in complementary areas (e.g., cleanup, materials science, software development). Witnesses also agreed that public education was key to increasing the viability of nuclear technologies. Member questions focused on funding, Yucca Mountain and nuclear waste issues, and the current and future role of nuclear technologies in the economy, including a potential hydrogen-based economy.

Mr. Magwood testified that DOE had not made a final decision to construct a Next Generation Nuclear Plan (NGNP), nor decided that it would be located at INL. He suggested that the NGNP, at a total cost between $1.5 billion and $2 billion, would be an operating, proof-of-concept pilot plant. He also stated that the project would be 50 percent cost-shared (including both private sector and international partner contributions). Mr. Magwood acknowledged a $90 million maintenance backlog at the Idaho laboratory complex (which includes the Idaho National Engineering and Environment Laboratory and the Argonne National Laboratory West—combined, the new INL) as described in a recent report of the Nuclear Energy Research Advisory Committee (NERAC). He indicated that the Department would address the backlog over a period of years.

Dr. Waltar stressed that national security and environmental concerns due to fossil fuel use should lead policy-makers to increased support for nuclear energy. Responding to questions on the waste issue from Ms. Woolsey and Mr. Bartlett, Dr. Waltar noted that there are ways to reduce the volume and half-life of nuclear waste products, and even to use them in value-added ways (e.g., to irradiate food or produce medical isotopes).

Dr. Long mentioned the importance of an active and independent review process of DOE's efforts in planning for INL and for all the labs conducting nuclear energy R&D. He testified that such a review process should be independent and more active than NERAC. He believed that in light of the current strains to our nation's resources, DOE and Office of Management and Budget would need to make "major changes" in the way in which DOE resources would be allocated to fund the INL.

Dr. Klein testified that he believed NE's budget was "totally inadequate" and that DOE's plan to make more funding available to NE as cleanups conducted by DOE's Environmental Management program wind down is "overly optimistic." He also noted that the Jet Propulsion Lab is a good model of a world-class lab that INL could emulate. He stated that the next few years were particularly critical for the development of the INL, and stressed that the program would require significant funding increases to gain world-class status.

4.3—SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS

4.3(a)—Harmful Algal Blooms and Hypoxia: Strengthening the Science

March 13, 2003

Hearing Volume No. 108–8

Background

On March 13, 2003, the Subcommittee on Environment, Technology and Standards held a hearing on harmful algal blooms and hypoxia. Harmful algal blooms (HABs) occur in aquatic environments when conditions trigger an increase in the abundance of plankton that produces toxins detrimental to aquatic life and to humans. HABs have been estimated to cost the U.S. economy as much as $50 million per year due to closure of fisheries and beaches and treatment of human illness from exposure to toxins. Hypoxia, caused by the decomposition of algal blooms (although not necessarily by a harmful algal bloom), is a condition where oxygen levels in an aquatic environment have been depleted to levels unable to support marine life. As such it disrupts the food webs that support fish and shellfish growth and causes economic and ecological damage of its own. The Subcommittee reviewed the research provisions of the Harmful Algal Bloom and Hypoxia Research and Control Act of 1998 (HABHRCA) as it looked to reauthorize HABHRCA, which expired in 2001.

The Committee heard testimony from: (1) Dr. Donald Scavia, Chief Scientist, National Ocean Service, National Oceanic and Atmospheric Administration (2) Dr. Charles G. Groat, Director, United States Geological Survey (3) Dr. Wayne Carmichael, Professor, Aquatic Biology and Toxicology, Department of Biological Sciences, Wright State University, Dayton, Ohio (4) Dr. Donald Anderson, Senior Scientist, Biology Department, Woods Hole Oceanographic Institute, Massachusetts; and (5) Mr. Dan Ayres, Fish and Wildlife Biologist, Washington State Department of Fish and Wildlife.

Summary of Hearing

Dr. Scavia began the hearing by providing an overview of the accomplishments of HABHRCA and two programs funded under NOAA's Coastal Ocean Program:

- The Act facilitated the development of an action plan to address hypoxia in the Gulf of Mexico and assessment of the problem of harmful algal blooms nationwide.
- Research sponsored by the Ecology and Oceanography of Harmful Algal Blooms (ECOHAB) project has yielded valu-

able data about the formation of blooms, which has been applied to developing models for forecasting and tracking blooms.

- Research from the Monitoring and Event Response for Harmful Algal Blooms (MERHAB) program has led to the development of new tools to provide early warnings about harmful algae and their toxins to state and tribal monitoring programs.

Dr. Groat testified about the challenges researchers face in developing useful modeling and monitoring techniques for the Mississippi River Basin:

- Water quality data on the region is gathered by U.S.G.S. and state agencies. There are inconsistencies in how the data is collected and reported that make it less useful than it could be for developing models.
- Additional watershed level monitoring research would provide better data for modeling and help inform control strategies.
- Ongoing research efforts in the Basin and Gulf of Mexico have been pared down as resources became tighter, so some data for modeling is becoming limited.

Dr. Carmichael provided testimony on the impacts of freshwater HABs, including their possible effects on humans and in the food web:

- There is an emerging link between invasive species and the emergence of new blooms in the Great Lakes, because the invasive organisms tend to select the toxic algae to grow.
- Increased hypoxia is also occurring in the Great Lakes, likely due to the invasive species altering nutrient dynamics in the lake.
- A coordinated federal, academic and private effort to address freshwater HABs is needed.

Dr. Anderson showed that algal blooms have increased in range and occurrence in the past thirty years and gave an overview on the research agenda for marine HABs, including what has been learned so far:

- Several algal species, which cause paralytic shellfish poisoning episodes, have been identified and mapped near the Gulf of Maine, and the toxic cycles that they initiate have been identified.
- Probes that electronically or chemically detect HAB cells of interest are being developed to be deployed on buoys and eventually help make HAB forecasts.
- Support for HABHRCA and ECOHAB will continue to allow researchers to develop these and other tools, and to perform research on alleviating the impacts of algal blooms. Funding for research should be new and separate for marine and freshwater research.

- Increased funding for partnership programs at the National Institutes of Environmental Health Sciences and NSF would be beneficial.

Mr. Ayres testified about his experiences as a fishery manager responsible for monitoring domoic acid in razor clam and Dungeness crab fisheries exposed to algal blooms, and his interactions with various government and economic stakeholders in the State of Washington:

- Funding from the MERHAB program has allowed the Department of Fish and Wildlife to set up a plankton monitoring program in conjunction with their current shellfish tissue testing program, which helps to provide advanced notice of problems to State and tribal fishery managers.
- Another MERHAB grant assists members of the Olympic Region Harmful Algal Bloom (ORHAB) project, to develop detection technologies and test kits and perform plankton identification training programs.
- Additional technologies that could predict algal blooms would be most valuable to him as a state fishery manager; so that he could shift harvesting seasons and lessen the impact of harvesting closures on the local economies.

4.3(b)—Transportation Research and Development: Investing in the Future

April 10, 2003

Hearing Volume No. 108–10

Background

On April 10, 2003, the Subcommittee on Environment, Technology, and Standards held a hearing on Research and Development (R&D) priorities for the reauthorization of the *Transportation Equity Act for the 21st Century* (TEA–21). TEA–21 funded a wide range of transportation R&D programs conducted by the Federal Government, states, universities and the private sector. The hearing examined the state of the current R&D programs, how well they are meeting the goals laid out in TEA–21, and whether there are significant gaps in our R&D programs. In addition, the hearing investigated how the Department of Transportation (DOT) can improve the quality of the R&D it funds, and measure the success of individual R&D projects, R&D programs, as well as the transportation system as a whole.

The Committee heard testimony from: (1) Mr. Emil Frankel, Assistant Secretary for Transportation Policy, U.S. Department of Transportation; (2) Mr. Eric Harm, Deputy Director, Division of Highways, Illinois Department of Transportation; (3) Dr. Michael Walton, Ernest H. Cockrell Centennial Chair, University of Texas at Austin Department of Civil Engineering; (4) Ms. Kate Siggerud, Acting Director, Physical Infrastructure Team, General Accounting Office; (5) Ms. Anne Canby, President, Surface Transportation Policy Project; and (6) Dr. Michael Meyer, Professor, Georgia Institute of Technology School of Civil and Environmental Engineering.

Summary of the Hearing

Mr. Frankel opened the hearing with a summary of the achievements of the Department of Transportation's (DOT's) R&D programs under *Intermodal Surface Transportation Efficiency Act* (ISTEA) and *Transportation Equity Act for the 21st Century* (TEA–21), including Intelligent Transportation Systems (ITS), pavement improvements and safety-related behavioral research. Mr. Frankel added that these achievements and innovations are built upon in the Administration's surface transportation reauthorization in order to extend the concept of "smart transportation" to the entire surface transportation sector.

Mr. Harm discussed the State of Illinois' perspective on the federal research program, and described how the State applies federally funded research. He stressed the importance of long-term research and the results research will provide in a 10-to-20 year timeframe. He also suggested the need for research to look at alternative ways of moving people and goods and addressed how to increase intermodal efficiency, as outlined in the American Association of State Highway and Transportation Officials (AASHTO) recommendations.

Dr. Walton testified about the organization and accomplishments of the Future Strategic Highway Research Program (F–SHRP) and the ITS Program. He outlined the goals of these research programs, and suggested that improvements can be made in distributing ITS deployment funding. He believes that changing how the program is funded, and overcoming several non-technical barriers, will allow for many new technologies to be transferred to the marketplace. Dr. Walton also suggested that Congress should mandate the creation of a national strategic plan for highway transportation research and development to more effectively utilize federal resources.

Ms. Siggerud discussed a General Accounting Office (GAO) report that evaluated the Federal Highway Administration's (FHWA's) implementation of research management practices issued last year. The report recommended an increase in stakeholder participation by consulting with external parties when developing research agendas, and called for using a systematic approach to evaluate ongoing and completed research. FHWA is in the process of implementing these suggestions. Ms. Siggerud stated that FHWA's draft proposals have taken the recommendations into account, but could still more effectively manage federal highway research dollars.

Ms. Canby focused on a broad array of issues to be considered within a comprehensive research agenda and called for the creation of a metropolitan planning and research program that would parallel existing state research programs. She also discussed the need to fill data gaps within intermodal research and to address other key trends, such as the needs of an aging population and the increase in household transportation costs.

Dr. Meyer outlined several demographic and social trends that will impact the transportation system. These trends include the concentration of people within metropolitan areas, and an aging population traveling on non-peak hours and utilizing more public transportation. He stated that research is necessary in order to

plan for these emerging trends, and outlined a potential research program that would be run through the Transportation Research Board. He also identified criteria for evaluating research programs.

Chairman Ehlers asked a series of specific questions to the panel: Do we invest enough in surface transportation R&D? Should we increase research funding relative to total transportation funding? Is the current funding balanced between different areas of research?

All of the witnesses, with the exception of Mr. Frankel, stated that research is under-funded and that research funding should increase proportionately in the total transportation funding pool. Ms. Canby and Dr. Meyer stressed that the efficiencies and products of the program pay for themselves. Dr. Frankel asserted that there can always be more funding, but he believed funding levels were adequate. He also noted that it is difficult to calculate the return on investment for transportation research and development.

As to the question of balance, the witnesses agreed that improvements could be made. Dr. Meyer, Ms. Canby and Dr. Harm all stressed the need for more funding for policy research, intermodal research and human factors research. Mr. Harm noted that while transportation R&D has been very good at developing new materials, he would like to see more multidisciplinary research yield more innovative transportation policy. Dr. Walton and Mr. Frankel stated that the DOT needed a strategic vision for research and that out of this vision; a better balance in research funding would emerge. Mr. Frankel acknowledged that it is difficult to secure funding for policy research within the Office of the Secretary when there are so many programs seeking resources.

4.3(c)—Manufacturing R&D: How Can the Federal Government Help?

June 5, 2003

Hearing Volume No. 108–11

Background

On June 5, 2003, the Subcommittee on Environment, Technology, and Standards held a hearing to review the most serious problems facing U.S. manufacturing with a particular focus on federal research, development, and technical assistance programs.

Manufacturers are raising concerns that the United States is losing its competitive advantage in manufacturing technology, and that this will contribute to permanent job losses to oversees competition. The manufacturing community, industry analysts, and economists believe that significant, extensive changes are afoot in the manufacturing sector beyond the effects of the recent recession. Although U.S. firms, particularly the small and medium-sized manufacturers, cannot compete with the wage differential in many foreign countries, they can compete through factors influenced by the application of technology, knowledge, and skills. There are federal programs designed to help firms develop these capacities. Although effective, the funding levels of these programs have been controversial.

The Committee heard testimony from: (1) Thomas Eagar, Thomas Lord Professor of Materials Engineering and Engineering Sciences, Massachusetts Institute of Technology, Cambridge, MA; (2) Larry Rhoades, President, Extrude Hone Corporation, Irwin, PA; (3) Herman Reininga, Senior Vice President, Special Projects, Rockwell Collins, Cedar Rapids, IA; (4) Jay Dunwell, President, Wolverine Coil Spring, Grand Rapids, MI; and (5) Jason Farmer, Director of Research and Development, Light Photonics Corp., Vancouver, WA.

Summary of Hearing

Each of the witnesses offered their own testimonials to the changing business cycles in U.S. manufacturing. Mr. Eagar began by arguing that the U.S. industrial sector is not necessarily in a 'crisis;' it is in a transition period similar to the transformation from farming to manufacturing at the end of the 19th Century. He argued that for the U.S. to retain a vibrant manufacturing sector it must rely on technology to develop new methods of high-value manufacturing, rather than relying on mature commodity-producing industries that must compete on price in world markets. Mr. Eagar strongly believed that educating the workforce was the foundation upon which such a technology-driven strategy would depend.

Mr. Rhoades began his testimony by discussing the U.S. advantages in production: capital and innovation. He believed the U.S. lacks a coordinated national program for promoting manufacturing and that existing federal programs, such as MEP and ATP, should be expanded and strengthened. Furthermore, Mr. Rhoades advocated substantially expanded support for the defense manufacturing industry.

Mr. Reininga began with an overview on the current status of the avionics industry and how it has been adjusting to economic circumstances. With a reduced number of aircraft being produced, Rockwell Collins has noted that suppliers are having difficulty making the financial and operational adjustments to a smaller market. Mr. Reninga advocated the industrial transformation supported in part through a consortium of companies called the Defense Manufacturing Technology Program, which reported on ways to increase manufacturing productivity and competitiveness. Mr. Reininga also presented a report produced by the National Association for Manufacturers that detailed the need for a high-level official within the federal administration to address manufacturing issues to coordinate resources and serve as a advocate for the industry.

Mr. Dunwell testified on the challenges to small manufacturers and the efforts of the Manufacturing Council, supported by the MEP program, to assist these manufacturers to maintain their competitiveness. He discussed how his company has continually improved its manufacturing processes to become a more efficient and competitive supplier to the auto industry, yet is still losing business to Asian manufacturers. Mr. Dunwell believed that federal programs, like the MEP, are critical for providing infrastructure support to smaller manufacturers and, by doing so, encourage innovation.

Mr. Farmer presented testimony about funding that bridges the "valley of death"—the funding gap that exists between applied research and the development of new products. He said that the sophisticated manufacturing technologies in which the U.S. has a natural advantage required a longer development period and significant investment before yielding returns. The Small Business Innovation Research program assists with the commercialization of these types of technology and provides the infrastructure for long-term development. Mr. Farmer's company was able to translate technology derived from U.S. basic research into business application and used the SBIR program to negotiate the intermediate development phase and eventually raise venture capital to commercialize it fully.

Several witnesses drew attention to the fact that the U.S. lacks a coordinated federal program for promoting investment in manufacturing projects, and that overall industrial R&D is being shifted from long-term research to more short-term, directed projects.

4.3(d)—NOAA Satellites: Will Weather Forecasting Be Put at Risk?

July 15, 2003

Hearing Volume 108–19

Background

On July 15, 2003, the Subcommittee on Environment, Technology and Standards held a hearing to examine satellite programs at the National Oceanic and Atmospheric Administration (NOAA). NOAA procures and operates the Nation's environmental monitoring satellites, which provide raw data and processed data products to the National Weather Service (NWS), the Department of Defense (DOD), and the public for weather forecasting and prediction. NOAA performs these duties through its line office, the National Environmental Satellite, Data, and Information Service (NESDIS). NOAA is in the final preparation stages (and has awarded the prime contract) for the new National Polar-orbiting Operational Environmental Satellite System (NPOESS), which has a lifetime (23 years) cost of $6.5 billion. While NOAA is the lead agency, NPOESS is a tri-agency effort among NOAA, the National Aeronautics and Space Administration (NASA), and DOD to combine and integrate the polar satellite needs and capabilities of all three agencies. The procurement cost is shared equally between NOAA and DOD. Given the tremendous cost and important mission of NOAA's environmental satellites, the Subcommittee will be providing continuous oversight of this project.

The Committee heard testimony from: (1) Mr. Gregory Withee, Assistant Administrator for National Environmental Satellite, Data, and Information Service, National Oceanic and Atmospheric Administration; (2) Mr. Peter Teets, Undersecretary of the Air Force and Department of Defense Executive Agent for Space; (3) Mr. David Powner, Acting Director, Information Technology Management Issues, General Accounting Office; (4) Mr. Wes Bush, President, Northrop Grumman Space Technology, the prime contractor for NPOESS; and (5) Dr. Ronald McPherson, Executive Di-

rector, American Meteorological Society, former Director of the National Weather Service's National Centers for Environmental Prediction (NCEP).

Summary of Hearing

Mr. Withee provided testimony on NOAA's mission to provide weather and climate information to the Nation, and how NOAA will ensure the NPOESS satellite data and data products are properly maintained, archived, and distributed.

- The Nation is accruing substantial benefits from NOAA's satellite systems in terms of saving life, property, and environmental monitoring; NOAA anticipates NPOESS will add to these benefits.
- The current Polar-orbiting Operational Satellite (POES) is performing well and NOAA anticipates the first NPOESS satellite will be ready for launch in late 2009.
- If the last POES satellite fails there would be a 21-month gap in polar satellite coverage until the first NPOESS satellite is ready for launch. In the interim, NOAA would be forced to rely on the only available polar satellite at the time, the European METOP satellite.

Mr. Teets provided testimony on DOD's mission of providing weather and climate information to the military, and how DOD will ensure the NPOESS satellite data and data products can be properly maintained, archived, and distributed.

- The Department of Defense fully recognizes the importance of continuous global weather forecasting ability and believes that NPOESS will support improved weather forecasting worldwide.
- The first NPOESS satellite is scheduled for launch in 2010, in the meantime the DOD has five of its own satellites that will be launched every two years. The DOD is confident in its current and future capability to predict worldwide weather to serve the military's needs.
- The DOD believes that it is important to keep on the current NPOESS budget schedule.

Mr. Powner outlined the preliminary findings of the General Accounting Office concerning the merging of NOAA and DOD's satellite programs and the potential gaps in coverage due to delays in launching the first NPOESS satellite.

- The joint NOAA and DOD satellite program is faced with significant risks that must be effectively addressed to keep the program on track.
- Key sensor development efforts have experienced cost increases, schedule delays, and performance shortfalls.
- At the same time, the Administration has decreased near-term funding levels for NPOESS. Originally, the NPOESS program was scheduled to be ready to launch its first satellite as a backup should the final launch of POES or the Defense Meteorological Satellite Program (DMSP) fail.

- As a result of funding decreases, the first NPOESS satellite will not be ready for launch until 21 months after it is needed to back up the final POES satellite, so there could be a gap in coverage if the last POES satellite fails.

Mr. Bush offered testimony about how the near-term funding decrease for NPOESS will affect Northrop Grumman's ability to follow the plan outlined in its contract.

- Northrop Grumman is responsible for the overall system design, integration, and performance of NPOESS, as well as development of three sensors.
- After Northrop Grumman learned of the cut in the Administration's budget, it was decided to reschedule the NPOESS launch to preserve the launch schedule for the NPOESS Preparatory Project and to avoid reducing NPOESS capabilities.
- The budget reduction will force Northrop Grumman to reorganize the entire team working on the program and reallocate the 32,000 tasks laid out in the original plan. This will also create staffing problems in other programs. This reprogramming reduces the cost effectiveness of the program.
- The budget reduction will delay the availability of NPOESS by 21 months.

Dr. McPherson provided testimony on how NPOESS data is used in weather forecasting, as well as what effect a 21-month loss in polar satellite coverage would have on users of polar satellite data.

- Polar-orbital data has made a significant contribution to the climate record and has increased the National Weather Services' forecasting capabilities from three to seven days.
- A gap in the availability of polar-orbital data will create gaps in the climate record.
- A gap could make three to seven day and severe weather forecasts very difficult.
- The country is very dependent on weather forecasts made possible by polar-orbited data. If that data is interrupted the impact could be very serious, especially for severe weather predictions such as hurricanes.

4.3(e)—What Is Space Weather and Who Should Forecast It?

October 30, 2003

Hearing Volume No. 108–31

Background

On October 30, 2003, the Subcommittee on Environment, Technology and Standards held a hearing to examine the space weather activities at the National Oceanic and Atmospheric Administration's (NOAA) Space Environment Center. The Space Environment Center (SEC) provides real-time monitoring and forecasting of solar and geophysical events. These events can: cause damage to communication satellites, electric transmission lines and electric transformers; interfere in ground-based communications with airline pi-

lots; be fatal to astronauts on space flights and in the International Space Station; and potentially harm airplane passengers flying polar routes. SEC forecasts are used by the U.S. military, the National Aeronautics and Space Administration (NASA), NOAA itself, and by the industries mentioned above. For example, on October 22, 2003, the SEC released two-day advanced warnings about an unusually large solar storm, which allowed electrical utilities, airlines, and spacecraft managers to take preventive action to minimize disruption of services due to the storm.

The Committee heard testimony from: (1) Dr. Ernest Hildner, Director, Space Environment Center, National Oceanic and Atmospheric Administration, Boulder, Colorado; (2) Col. Charles L. Benson Jr., Commander, Air Force Weather Agency, Offutt Air Force Base, Nebraska; (3) Dr. John M. Grunsfeld, Chief Scientist, National Aeronautics and Space Administration; (4) Mr. John Kappenman, Manager, Applied Power Systems, Metatech Corporation, Duluth, Minnesota; (5) Mr. Hank Krakowski, Vice President of Corporate Safety, Quality Assurance, and Security, United Airlines, Chicago, Illinois; and (6) Dr. Robert Hedinger, Executive Vice President, Loral Skynet, Bedminster, New Jersey

Summary of Hearing

Dr. Hildner provided the Committee an overview of NOAA's Center, and discussed the science of space weather:

- The SEC monitors, predicts, and forecasts conditions in the space environment and provides critical space weather data to a variety of government and commercial customers. It is the Nation's unique provider of this real-time information, which is vital to the Nation's economic, national, and homeland security.
- Space weather is defined as Conditions on the sun and in the solar wind, magnetosphere, ionosphere, and thermosphere that can influence the performance of space-borne and ground-based technological systems and can endanger human health. The direct global economic impact of space weather has been estimated, very conservatively, at $200 million annually.
- If the budget for the SEC is below the President's request of $8 million there will be dramatic consequences for the SEC and the services that it provides.
- The recent radiation and geomagnetic storms clearly illustrate the Nation's need for accurate, reliable, and timely space weather forecasting. The International Space Station, airlines, nuclear power plants, and satellites were all affected by the recent space weather events.

Col. Benson gave the Committee an overview of the Air Force space weather services provided through the Air Force Weather Agency (AFWA), and its relationship with NOAA's SEC:

- AFWA and the SEC operate complementary space weather forecasting centers. AFWA is responsible for military and national intelligence support while the SEC supports civilian and commercial users. AFWA and the SEC have a close

working relationship that allows them to leverage responsibility and share costs.

- AFWA relies on the SEC for real-time data relay and processing, partial backup, and expertise. AFWA uses SEC data and forecasts to provide military war fighters and Department of Defense (DOD) decision makers with mission-tailored space weather impact products.
- If the funding were cut to the SEC, the AFWA would face significant challenges if it were forced to assume the SEC's responsibilities. There would also be concerns as to whether it would be feasible for a military network to provide services to commercial interests.

Dr. Grunsfeld explained to the Committee how NASA uses data and products from the SEC and how space weather affects NASA operations:

- NASA uses SEC forecasts to make decisions regarding data collection, spacecraft operation and design, and for scheduling launches.
- Space weather can have adverse impacts on spacecraft and satellite operations by disrupting their orientation, reducing their lifetime and degrading communications and Global Positioning System signals. It affects the health of astronauts in orbit by increasing the intensity of the near-Earth radiation environment.
- If the funding were cut to SEC, NASA would face significant challenges if it were forced to assume the SEC's responsibilities. There would also be concerns as to whether it would be feasible for NASA to provide services to commercial interests.

Mr. Kappenman provided testimony on how space weather could affect electric power grid systems, and how the power industry uses data and products from NOAA's SEC:

- A space weather event can cause a widespread electric power system collapse, leaving 100 million people without electricity. Solar storms in the past have caused the shutdown of numerous grids across the northern United States and Canada.
- Power grid operators depend greatly on SEC forecasts, without them operators would have no warning and would not be able to intervene or take precautions before experiencing the harmful effects of a storm.

Mr. Krakaowski provided an overview of how space weather can affect airline operations, and how the airline industry uses data and products from NOAA's SEC:

- When flying northern polar routes, space weather activity can disrupt communications and navigation, and be dangerous to crew and passenger health. Information provided by the SEC allows airlines to take timely action to mitigate these risks.

- NOAA's SEC is a transparent and customer-oriented partner with the airlines.
- The SEC function is critical to the airlines and could not be preformed by the airlines themselves, due to the unique and complicated nature of the space environment. A reduction in funding to the SEC could cripple polar flight service by the airline industry.

Dr. Hedinger explained to the Committee how space weather could affect satellite operations, and how the satellite industry uses data and products form NOAA's SEC:

- Space weather events put critical telecommunications services and significant commercial investments at risk.
- Electrostatic discharges can cause temporary or permanent damage to on board satellite equipment.
- SEC forecasting allows the satellite industry to prepare themselves for solar events that could be detrimental to the spacecraft.
- The satellite industry could not survive without the data provided by the SEC.

4.3(f)—Mercury Emissions: State of the Science and Technology

November 5, 2003

Hearing Volume No. 108–34

Background

On November 5, 2003, the Subcommittee on Environment, Technology, and Standards held a hearing on the state of the science and technology regarding mercury emissions from coal-fired power plants. The Subcommittee heard testimony on the health effects of mercury, the transport and fate of mercury in the environment, and the technologies that are being developed to control mercury emissions from power plants.

The hearing addressed several overarching questions. What do we know about the relationship between mercury exposure from fish consumption and adverse human health effects? To what extent is mercury deposition in the environment local, regional, or global? What do we know about how different kinds of mercury become available in the environment in a manner that can adversely affect human health? Is there a difference between new and old mercury and between anthropogenic and naturally produced mercury? What technologies are available or being developed to control mercury pollution from power plants? What do we know about the effectiveness and cost of these technologies?

The Committee heard testimony from: (1) Dr. Thomas Burke, Professor and Associate Chair, Department of Health Policy and Management, Johns Hopkins University Bloomberg School of Public Health; (2) Dr. David Krabbenhoft, Research Scientist, United States Geological Survey; (3) Dr. George Offen, Senior Technical Leader, Air Emission and Byproduct Management, Electric Power Research Institute (EPRI); and (4) Mr. Ken Colburn, Executive Di-

rector, Northeast States for Coordinated Air Use Management (NESCAUM).

Summary of Hearing

Dr. Burke began the hearing by providing an overview of the National Research Council panel's findings on the relationship between low-dose mercury exposure and adverse human health effects:

- The panel evaluated the scientific evidence from animal and human studies and focused on three major epidemiological studies. Two of these studies (Faroe Islands and New Zealand) found adverse health effects from mercury exposure and one of them (Seychelles) found no effect. In evaluating the overall weight of the evidence, the panel based their recommendations on the findings from the studies showing adverse health effects. The Committee focused its analysis on the most vulnerable sub-population, unborn children. They found that there might be as many as 60,000 unborn children each year at elevated risk of adverse effects from mercury due to their mothers' exposure.
- The recent update of the Seychelles study, which still shows no effect, would not have changed the Committee's conclusion that there is a strong public health basis for the current Environmental Protection Agency's (EPA) reference dose. New studies have also raised concerns about potential cardiovascular effects due to mercury exposure.

Dr. Krabbenhoft gave a general overview of the science behind mercury fate and transport in the environment:

- Human activities have increased the amount of mercury cycling in the environment by a factor of about three to five times above pre-industrial times.
- The source of mercury at any particular location can vary widely. If the location is remote global sources dominate, however in settings near an emission source the local contributors are likely more important.
- Mercury that has been in the environment for longer periods of time is less likely to become methylated and be incorporated in the food web than "new" mercury that has not been in the environment for a long time.
- Studies have shown that when mercury emissions are reduced in areas near contaminated sites, the mercury levels in fish is also lower. However, the recovery time can range from years to decades.
- Research is needed to further the understanding of how the chemical forms of mercury react in the environment once emitted from the utility, as well as what factors control the reaction of ecosystems to mercury contamination.

Dr. Offen provided testimony about the control technologies used at utilities to reduce mercury pollution:

- On average power plants see about a 40 percent reduction in mercury emissions from their current emissions control de-

vices (used to control NO_X and SO_2). This number can vary widely over time and between sites. It is primarily dependent on the type of coal burned (and especially its chlorine content), and the air pollution control devices used at the plant.

- As far as the development of new technologies, there is an effort underway by the power industry as well as Department of Energy (DOE) and EPA to better understand the impact on mercury emissions from selective catalytic reduction for NO_X control and scrubbers for and SO_2 control. They are also attempting to develop a number of new technologies to reduce mercury emissions, including sorbent injection (such as activated carbon injection) and catalysts to transform elemental mercury into oxidized mercury.
- DOE is contracting with groups to test the effectiveness of these new technologies. Preliminary results show a 60–70 percent reduction in mercury in plants using sub-bituminous coal and up to a 90 percent reduction in plants using bituminous coal from sorbent injection.

Mr. Colburn provided testimony about the technological feasibility of controlling mercury emissions, and the relationship between regulation and technology development:

- A number of coal-fired power plants already achieve impressive mercury reductions through co-benefits (because of control devices used to reduce NO_X and SO_2), however there are technologies recently developed that can reduce mercury much further.
- Activated carbon injection and enhanced wet scrubbing are mercury specific technologies that have been very successful at reducing emissions.
- The only real barrier to controlling mercury emissions from power plants is the absence of a regulatory driver to create a market for mercury control technologies.
- Past history with controlling NO_X and SO_2 demonstrates that regulations with well defined targets and compliance deadlines drive innovation and control technology, resulting in dramatically lower implementation costs than initially anticipated.

4.3(g)—Fiscal Year 2005 EPA Budget

March 11, 2004

Hearing Volume No. 108–46

Background

On March 11, 2004, the Subcommittee on Environment, Technology, and Standards held a hearing to examine the Environmental Protection Agency's (EPA) Fiscal Year 2005 (FY05) budget request for the Office of Research and Development (ORD). Specifically, the hearing examined the steep cuts proposed to the Science to Achieve Results (STAR) grants program, and the potential consequences of the proposed reduction. Managed by ORD, the STAR

grants program supports research at colleges and universities on a wide range of environmental science issues. EPA's FY05 budget request proposed a $35 million (or 35 percent) reduction in the grant program, including reductions in research on ecological systems, pollution prevention, endocrine disrupters and mercury.[1] The hearing also examined the extent to which the Office of Management and Budget's (OMB) effort to assess the performance of government programs under its Program Assessment Rating Tool (PART) led the Administration to propose the reductions to the grant program.

The Committee heard testimony from: (1) Mr. Clay Johnson III, Deputy Director for Management, Office of Management and Budget; (2) Dr. Paul Gilman, Assistant Administrator, Office of Research and Development, Environmental Protection Agency; (3) Mr. Paul Posner, Managing Director of Strategic Issues, U.S. General Accounting Office (GAO), and Manager of GAO's recent report, Performance Budgeting: Observations on the Use of OMB's Program Assessment Rating Tool for the Fiscal Year 2004 Budget, GAO–04–174; (4) Dr. Genevieve Matanoski, Professor, Johns Hopkins University; Chair, EPA Science Advisory Board's Review of EPA's FY 2005 Budget Request; former Chair, EPA's Science Advisory Board (SAB); and (5) Dr. Costel Denson, Professor, University of Delaware, and member of the National Academy of Sciences panel that authored The Measure of STAR: Review of the U.S. Environmental Protection Agency's Science to Achieve Results (STAR) Research Grants Program (2003).

Summary of Hearing

Mr. Clay Johnson III began the hearing by praising EPA as a leader within the Federal Government when it comes to focusing on results. He stated that the PART assessment helps agencies look at programs with consistency. In the case of the EPA research programs, he stated that the PART assessment for ecological systems and pollution prevention research concluded them to be less results oriented than they could be or than other programs of a similar nature. He said some of the funds would be transferred to the Office of Prevention, Pesticides and Toxic Substances which was found to be more results-oriented. He argued that instead of focusing on the dollar amount of research funding, we should focus on the results we are getting from our research dollars. He closed by stating that he did not believe that the budget cuts would significantly impair the research programs, and that PART informs budget proposals, but there is nothing automatic that flows out of the PART assessments.

Dr. Paul Gilman offered a brief description of ORD, which conducts both basic and applied research in human and ecological health. He said that the EPA's emphasis is on research quality, and that the EPA has developed multi-year plans in each research area, and is a leader in the use of peer review. In addition, he said that ORD places great emphasis on collaborative research and development (R&D) to operate more efficiently, and its extramural grants program is well respected. He stated that ORD's research

[1]The proposed reductions to the STAR program described here and in detail below are compared to the President's FY04 budget request. EPA's final FY04 spending will not be available until the agency's operating plan is completed.

programs in particulate matter, ecological systems, and pollution prevention all have goals outlined in multi-year plans but that EPA is challenged to provide measures that truly demonstrate performance of what is often inherently long-term research. EPA is working with OMB to develop these measures, which will be valuable to demonstrate ORD's achievements clearly.

Mr. Paul Posner provided testimony about the Government Accounting Office's (GAO) findings and recommendations concerning the PART. Mr. Posner explained that GAO found that the PART has successfully developed linkages between performance and budgeting. It has more clearly informed budget decisions than its predecessors, and has been a more open process to the public. However he said that developing tools to measure federal programs are not easy since each program has multiple goals. In addition, many measures are inherently subjective and require judgment (which is difficult within the PART's yes/no format). Mr. Posner closed by recommending that OMB continually improve its PART and its guidance for using PART, provide a more targeted selection process for programs to be assessed, early consultation with Congress, and a congressionally created process to better identify congressional oversight priorities.

Dr. Genevieve Matanoski provided testimony on the views of EPA's Science Advisory Board regarding EPA's FY05 Science and Research Budget Request. She stated that in the past the Board has noted its deep concern over the constant erosion of EPA's research budget, and the FY05 budget request not only continues this erosion, but actually cuts funding which will severely constrain EPA from providing the necessary science to inform decision-making. Dr. Matanoski discussed the STAR program, slated for the largest cuts, and said that it provides many benefits to EPA, including the flexibility to obtain critical scientific expertise in a wide range of disciplines that are essential to addressing emerging issues that are outside EPA's current areas of expertise. Another function of STAR is to help EPA balance its internal and extramural research portfolios to integrate many different institutions into a research program that complements the work of EPA's own scientists. She stated that the Board believes these cuts will have a negative impact on the balanced research portfolio that EPA has developed over the last decade.

Dr. Costel Denson provided testimony regarding the unanimous findings and recommendations of the National Research Council (NRC), the operating arm of the National Academies. He explained that the STAR program is judged to be the best mechanism available for providing the best science through extramural sources and environmental regulatory decisions must be informed by the best science. Dr. Denson also pointed out that research in STAR is focused on EPA's and the country's greatest environmental needs and that the STAR program has an exceptional process for the peer-review of proposals. He stated that the NRC panel developed its own metrics for STAR including findings and recommendations.

4.3(h)—H.R. 3980, National Windstorm Impact Reduction Act of 2004

March 24, 2004

Hearing Volume No. 108–51

Background

On Wednesday, March 24, 2004, at 2:00 p.m., the Subcommittee on Research and the Subcommittee on Environment, Technology, and Standards of the Committee on Science of the U.S. House of Representatives held a joint hearing to receive testimony on H.R. 3980, the *National Windstorm Impact Reduction Act of 2004,* and to consider the role of federal research and development in windstorm hazard reduction. The hearing intended to build upon discussions from a February 9, 2004, Science Committee field hearing on windstorm hazards that was held in Lubbock, Texas.

The witnesses were: (1) Dr. John A. Brighton, Assistant Director for Engineering, National Science Foundation (NSF); (2) Mr. Anthony S. Lowe, Administrator, Federal Insurance Mitigation Administration, emergency Preparedness and Response Directorate, Department of Homeland Security; (3) Dr. Steven L. McCabe, Professor, Department of Civil, Environmental, and Architectural Engineering, University of Kansas; and (4) Mr. Jeffrey C. Sciaudone, Director, Engineering and Technical Services, Institute for Business and Home Safety (IBHS).

Summary of Hearing

Chairman Smith opened the hearing by noting that every state in the Nation is vulnerable to windstorms and that vulnerability is increasing because of rapid population growth in high-risk areas. Ms. Johnson speculated that the savings from reduced loss of life and property would have more than paid for the investment in research had a program for wind research been established at the same time as the successful program for earthquake preparedness research. Mr. Neugebauer and Mr. Moore, the sponsors of the legislation, both made opening comments on H.R. 3980. Mr. Neugebauer said that a National Academy of Sciences' review found a lack of leadership, focus, and coordination of wind hazard mitigation activities in the Federal Government and insufficient R&D funding. Mr. Moore emphasized that this is not a partisan issue but a human one.

Dr. Brighton testified that the bulk of NSF's work in windstorm hazards research occurs in three directorates: Social, Behavioral, and Economic Sciences; Geosciences; and Engineering. He also gave specific examples of ongoing NSF programs and added:

- NSF support of research centers has been very important to windstorm hazards research. NSF supports the Center for Analysis and Prediction of Storms at the University of Oklahoma in cooperation with the National Oceanic and Atmospheric Administration. NSF also supports the Center for Collaborative Adaptive Sensing of the Atmosphere at the University of Massachusetts at Amherst.

- NSF coordinates its activities with other federal agencies including the National Institute of Standards and Technology and the Federal Emergency Management Agency. They also coordinate their investment with the U.S. Weather Research Program.
- NSF has several concerns about the proposed legislation, including:
    1. The interagency working group proposed in H.R. 3980 is redundant with the existing mechanisms in the National Science and Technology Council that is working well.
    2. The National Advisory Committee on Windstorm Impact Reduction is redundant with the advice agencies already receive through professional societies, meetings, and workshops.
    3. NSF supports basic research, not research to address specific goals or priorities. NSF is concerned about the unintended consequences of codifying a research program into law.

Mr. Lowe testified that FEMA currently has several programs geared towards hazard mitigation, such as the National Earthquake Hazards Reduction Program, the National Dam Safety Program, and the National Hurricane Program. Each of these programs is leveraged to provide all-hazards mitigation. He added:

- Other than FEMA's National Hurricane Program, there is little coordinated effort among federal agencies towards addressing the effects of wind hazards.
- FEMA conducts post-disaster studies to determine how structures performed and to issue guidance on how to build more disaster-resistant structures.
- FEMA has developed several technical guidance documents and helped establish national standards for in-home and community shelters. Also, many states use FEMA's post-disaster Hazard Mitigation Grant Program to fund wind hazard shelters.

Dr. McCabe testified on behalf of the Wind Hazards Reduction Coalition and the American Society of Civil Engineers. He believes that the current $5–10 million federal investment in wind engineering research is not adequate given the $6 billion of damage suffered annually as a result of wind hazards. He went on to say:

- Two National Research Council reports recommend the establishment of a national program to reduce wind vulnerability and the funding of a coordinated national wind hazard reduction program made up of partnerships of Federal, State, and local governments, private industry, and the research community.
- There is a need to develop a greater understanding of severe winds and their impacts on the built environment, assess the performance of the built environment under severe winds, and transfer research results to the design and construction industries.

- The Wind Hazards Reduction Coalition has two concerns with H.R. 3980: (1) there is no new federal money authorized in the legislation and (2) the Coalition strongly supports the creation of a National Advisory Committee on Windstorm Impact Reduction.

Mr. Sciaudone testified that IBHS' windstorm impact reduction activities generally involve applying the results of R&D for consumers and insurers. They produce a number of consumer and insurer focus publications and interactive internet tools to explain windstorm mitigation. They are also involved in model building code development and building code adoption that encourages inclusion of mitigation research in building regulations. He added:

- The number one obstacle to convincing building owners to mitigate against windstorms is cost. Owners would prefer to spend that money on amenities people will enjoy every day. Cost is also the most used argument against implementing mitigation measures as part of building codes, but further data will justify the need to include them.
- Data on windstorm hazards is not easily obtained because extreme windstorms do not occur every day and always are unique when they do occur. Also, insurance adjusters do not always collect data useful for wind researchers.

4.3(i)—Fiscal Year 2005 National Institute of Standards and Technology Budget: Views From Industry

April 28, 2004

Hearing Volume No. 108–54

Background

On April 28, 2004, the Subcommittee on Environment, Technology, and Standards held a hearing to examine the role of the National Institute of Standards and Technology's (NIST) laboratories in serving industry and whether the funding for the NIST laboratories was adequate to support the measurement and standards needs of the U.S. economy. The hearing also reviewed how the NIST Fiscal Year (FY) 2005 budget request for its laboratory research programs helped support industry, homeland security, and its mission in measurement technology and standards development.

The Subcommittee heard testimony from: (1) Mr. Daryl Hatano, Vice President for Public Policy for the Semiconductor Industry Association; (2) Dr. Thomas Cellucci, President and Chief Operating Officer at the Zyvex Corporation, a nanotechnology company located in Richardson, Texas. Dr. Cellucci has worked for several technology companies; (3) Ms. Deborah Grubbe, Corporate Director for Safety and Health at DuPont, headquartered in Wilmington, Delaware. Ms. Grubbe is also a member of the NIST Visiting Committee on Advanced Technology (VCAT), an advisory committee established by National Institute of Standards and Technology Act; (4) Mr. James Jasinski, Vice President of Federal and State Systems for Cogent Systems, a biometrics company headquartered in Pasadena, California. Cogent Systems has worked with NIST on the development of biometrics for the United States Visitor and Im-

migrant Status Indicator Technology (U.S.–VISIT) program; and (5) Mr. John Biechman, Vice President for Government Affairs for National Fire Protection Association (NFPA). NFPA works with NIST on standards for equipment for firefighters and first responders.

Summary of Hearing

Mr. Daryl Hatano began the hearing by providing an overview of semiconductor research, and the role NIST has played in chip metrology research.

- NIST's spending on semiconductor research has not been sufficient.
- NIST's lithography equipment is not up to industry standards.
- The SIA supports increased spending at NIST laboratories: $25 million to support the AML and $16 million for advances in manufacturing.
- The SIA encourages budget increases that compliment NSF and Defense spending for university research.
- He recommended that the Committee add language similar to that of last year's House Appropriations Report for NSF encouraging NSF to increase research aimed at the challenges outlined in the semiconductor roadmap.

Dr. Thomas Cellucci provided testimony on how NIST contributes to the development of nanotechnology and his corporation of Zyvex.

- NIST is responsible for developing the measurements, standards, and data critical to emerging fields such as nanotechnology.
- The Nanotechnology industry is in need of standards for nanoscale materials and tools.
- The Nanotechnology industry relies on NIST to provide traceable standards and information on emerging trends for tighter tolerances and higher resolution requirements for industry.
- NIST and Zyvex jointly share the cost and responsibility of bringing this new technology to the marketplace.
- It is necessary to increase NIST's budget in order to develop the critical technology needed to fight a war on terrorism and increase our technological leadership in the world.

Ms. Deborah Grubbe provided testimony on how NIST helps to ensure the U.S. business competitiveness by presenting examples from her firm, the DuPont Company.

- NIST has led a successful collaboration with DuPont and other industry leaders to develop new measurement standards and procedures for the color and appearance of automotive paints and finishes.
- NIST has worked closely with DuPont and the fuel cell industry because of their unique capability to internally image operating fuel cells using neutron radiography.
- NIST has the expertise to support DHS but not the funding.

- She believes that it is essential to recognize NIST as a key leader in our nation's innovation engine.

Mr. James Jasinski provided testimony on the contributions NIST has made to the U.S. in homeland security and the war on terrorism.

- NIST developed standards for automatic fingerprint identification systems (AFIS) enabling systems across the globe to communicate with one another.
- NIST stepped in to validate the U.S.–VISIT program, creating a higher degree of reliability and selectivity so that a person will not be falsely accused.
- NIST is working with Homeland Security to establish standards to optimize the U.S.–VISIT program.
- People all over the world rely on NIST to establish standards.

Mr. John Biechman provided the Committee with testimony on the NFPA's relationship with NIST and their support for the Building and Fire Research Laboratory at NIST.

- NIST has aided NFPA in the advancement of fire and building safety measures.
- NIST provides resources for fire investigation to help the fire service better understand fire dynamics, protect occupants and firefighters and assist in building safer buildings.
- NIST research will lead to the development of better firefighter protective clothing.
- Following the events of 9/11, NIST has been working to develop revisions to elevator standards for use in occupant evacuation and fire service access during emergencies in high-rise buildings. Congress has not yet appropriated funds to enable NIST to do this work.
- There is no other laboratory in the U.S. that is capable of conducting research for the public good as NIST. The proposed funding for 2005 does not approach the kind of funding necessary to carry out the added workload of the lab.
- Budget restrictions have caused many ongoing projects to be delayed.

4.3(j)—Homeland Security Research and Development at the EPA: Taking Stock and Looking Ahead

May 19, 2004

Hearing Volume No. 108–60

Background

On May 19, 2004, the Subcommittee on Environment, Technology, and Standards held a hearing to examine the homeland security research and development (R&D) activities of the Environmental Protection Agency (EPA). The hearing focused specifically on two EPA R&D programs: one focused on improving the security of the Nation's critical water infrastructure and the other one fo-

cused on methods to decontaminate buildings that have been exposed to chemical or biological agents (such as anthrax and ricin). Both programs are housed in EPA's Homeland Security Research Center (HSRC), which EPA established in 2002 and plans to discontinue at the end of Fiscal Year 2005 (FY05). The hearing focused on how the programs are working, how they are coordinated with the Department of Homeland Security (DHS), and the rationale for the proposed budget cut to the building decontamination program. The National Academy of Sciences (NAS) recently reviewed these programs and was critical of, among other things, EPA's focus on short-term research needs to the exclusion of necessary long-term research.

The Committee heard testimony from: (1) Dr. Paul Gilman, Assistant Administrator for the Office of Research and Development, U.S. EPA; (2) Dr. Penrose (Parney) C. Albright, Assistant Secretary, Science and Technology Directorate, Department of Homeland Security (DHS); (3) Dr. Charles E. Kolb, Jr., President and CEO of Aerodyne Research, Inc. and a member of the National Academy of Sciences panel that authored *Review of EPA Homeland Security Efforts: Safe Buildings Program Research Implementation Plan, EPA's Safe Buildings Research Program* (2003); and (4) Dr. Gregory B. Baecher, Professor and Chairman of the Department of Civil and Environmental Engineering, University of Maryland, and a member of the National Academy of Sciences panel that authored *Review of EPA Homeland Security Efforts: Safe Buildings Program Research Implementation Plan (2003).*

Summary of Hearing

Dr. Paul Gilman began the hearing by providing an overview of the EPA's areas of responsibility in homeland security research.

- EPA is responsible for the protection of water infrastructure, decontamination and cleanup following either a chemical or biological attack, constructing a water systems surveillance infrastructure, and conducting research in support of decontamination and water systems.
- EPA research is focused on short-term results, filling gaps in knowledge and technology, high intensity activity and applied solutions. The goal is to turn out high quality products to address user's needs quickly.
- Research priorities were established through assessing stakeholders' needs such as the water companies and those involved in building design and operation.
- Examples of products include a web-based catalog of technical resources, an assessment of residential safe havens, early warning systems, and new models to assess the exposure from the collapse of a building or contamination of water.
- EPA is analyzing the products they have to date in collaboration with DHS, the Homeland Security Council at the White House, the Department of Defense (DOD) and a number of other intelligence organizations to try to understand evolving threats and needs.

- There is a continuing need for research and the EPA will be taking that input into account as the Administration prepares the EPA's budget for FY06.

Dr. Penrose Albright provided testimony on how EPA and DHS are coordinating on homeland security R&D in the areas of water systems and building security.

- Homeland Security Presidential Directives (HSPD)–7 and –9 assigned EPA as the lead agency to enhance the protection of the Nation's water supply.
- HSPD–10 designated EPA as the lead agency to coordinate the development of strategies, guidelines, and plans for decontamination following a biological attack.
- DHS and DOD will assist by providing needed detection and decontamination technologies to EPA, along with integrated systems approaches to these issues.
- DHS is collaborating with EPA to develop pre-approved plans and decontamination agents for restoration of airports, and in establishing appropriate cleanup levels for the biological decontamination of public facilities.
- These programs do not address longer-term needs inherent in an affordable and timely integrated biodefense.
- The underlying experimental database for setting cleanup standards and performing risk assessments is extremely sparse.

Dr. Charles E. Kolb provided the Committee with a review and recommendations for the EPA's Safe Buildings R&D effort.

- EPA must structure its research program around the four logical components of an effective safe building R&D program (detection of the chemical or biological agent, containment of that agent, decontamination of the affected areas of the building, and disposal of cleanup materials and residue).
- Given the short time period and relatively low funding, the National Research Council recommends that the agency focus its R&D program on specific areas that would be amenable to progress in that kind of time scale, specifically decontamination and disposal activities. Detection and containment activities are longer-term activities.
- The National Research Council recommended that EPA spend more effort and resources on their coordination with other agencies.

Dr. Gregory B. Baecher provided the Committee with key findings and recommendations for the April 2003 Draft Plan from the EPA. He also addressed whether there is sufficient collaboration between EPA and other interests to ensure that the research agenda is focused.

- The National Research Council commends the agency for the speed and diligence of its efforts, but believes that certain technological advances can only be accomplished through long-term research.

- These research projects themselves will not result in improved protection of our nation's water systems. EPA needs to prepare plans to integrate research results into guidance, and providing funding for implementation of plans.
- EPA has not revealed financial resources required to complete research and implement countermeasures.
- EPA recognizes the importance of coordination among other relevant agencies, but makes presumptions about the activities and capacities of other agencies that need to be verified.
- The roles and responsibilities of various relevant parties need to be worked out ahead of time and parties must develop an effective communication strategy while addressing security concerns.

4.3(k)—Testing and Certification for Voting Equipment: How Can the Process Be Improved?

June 24, 2004

Hearing Volume No. 108–65

Background

On June 24, 2004, the Subcommittee on Environment, Technology, and Standards held a hearing to examine how voting equipment is tested against voting system standards and how the independent laboratories that test voting equipment are selected.

Each election season, a small number of newly deployed voting machines fail to perform properly in the field, causing confusion in the polling places and concerns over the potential loss of votes. Because these machines have already been tested and certified against standards, these incidents have raised questions about the reliability of the testing process, the credibility of standards against which the machines are tested, and the laboratories that carry out the tests. While most of the national attention on voting systems has been focused on the subjects of computer hacking and voter-verifiable paper ballots, press reports have also highlighted the problems of voting machine testing.

The Committee heard testimony from: (1) Rep. Rush Holt (D–NJ); (2) Mr. Tom Wilkey, Chair, National Association of State Elections Directors (NASED) Independent Testing Authority (ITA) Committee. Mr. Wilkey is the former Executive Director of the New York State Board of Elections; (3) Ms. Carolyn Coggins, Director, Independent Testing Authority Services for SysTest Laboratories, a Denver laboratory that tests software used in voting machines; and (4) Dr. Michael Shamos, Professor of Computer Science, Carnegie Mellon University. Mr. Shamos has served as an Examiner of Electronic Voting Systems for Pennsylvania.

Summary of Hearing

Rep. Rush Holt, began the hearing by highlighting some of the concerns surrounding computerized voting.

- Standardizing today's computer voting devices has been difficult because there is a gap between the casting of the vote

and the recording of the vote, which makes the process quite a bit different from the voting machines of the past.

- While the Help America Vote Act went a long way in improving accessibility, it fell short of dealing with auditability—that is, verifiability that is build into the system and that is part of the audit process—which has important implications for the certification process.

Mr. Tom Wilkey discussed the selection of Independent Test Authorities by NASED and its program to encourage States to adopt the federal voting system standards, and to utilize test reports which have been issued by these ITAs.

- NASED does not certify voting equipment or systems; instead, NASED's role is solely limited to review and qualify perspective ITAs and provide for the review of reports by its technical subcommittee before they are sent to the vendors and to state ITAs and others designated by States to receive and review them.
- While several laboratories have been encouraged to join the ITA project, most have declined the opportunity after the consideration of the sheer volume of business and negative publicity, although laboratories will continue to be encouraged to participate as the program transitions to the Election Assistance Commission and to NIST in the coming months.

Ms. Carolyn Coggins provided testimony about NASED qualification testing.

- NASED qualification testing is the second level of four levels of testing identified by the Voting System Standards and means that the hardware, software, and all documentation of the voting system have been defined, reviewed, and tested for conformance with the requirements of the Voting System Standards, and that voting is secret, accurate, and reliable.
- Accreditation of primary labs responsible for all hardware and software testing and ability of primary labs to have qualified subcontractors to perform environmental testing.
- Before the 2006 Election, implement the 2002 VSS plan, which has a process for issuing clarification bulletins.

Dr. Michael Shamos described the voting machine testing and certification process and current flaws in the system.

- The current qualification testing process by Independent Testing Authorities is not effective because of security concerns, and because the procedures are closed to the public.
- Any testing laboratories should be certified and rigorously monitored by the EAC, or such other national body as Congress may create, and the cost of testing should be shouldered by the States on a pro rata basis, possibly out of HAVA funds.
- Although NIST will play a role in improving the way voting equipment is tested, the EAC, which has the great election expertise, needs to be the primary force behind such processes.

From the testimony, it seems that the end-to-end process of accrediting laboratories, testing voting equipment, and certifying voting systems could use some improvement in addition to the overhauling of the standards against which voting equipment is tested. A new suite of standards for voting equipment is fundamental to good testing. However, even if all the necessary changes are made to the testing process at the national level, there will continue to be a need to thoroughly test each machine when delivered to the States or localities that have bought them, before deployment for use in actual elections. The panel was clear on the point that the States still would be responsible for this aspect of voting machine performance even after HAVA had been fully implemented.

The EAC and NIST are working to re-accredit the testing labs under the National Voluntary Laboratory Accreditation Program criteria, which will contribute to improved rigorousness in the testing environment and procedures at the ITAs. As technologically driven as elections have come to be, the hearing highlighted just how much the EAC will be dependent on NIST's technological expertise as the EAC oversees the reform of the Nation's federal elections. It is also clear that the most fundamental reforms required in HAVA will not be implemented in time to have any effect on the 2004 election.

4.3(l)—The National Oceanic and Atmospheric Administration Organic Acts

July 15, 2004

Hearing Volume No. 108–67

Background

On July 15, 2004, the Subcommittee on Environment, Technology, and Standards held a hearing on H.R. 4546, the *National Oceanic and Atmospheric Administration Act,* and H.R. 4607, the *National Oceanic and Atmospheric Administration Organic Act of 2004.*

NOAA was established in the Department of Commerce by Executive Order in 1970 under President Nixon. The 1970 Executive Order primarily consolidated the ocean and atmospheric activities of various federal agencies under NOAA. The order did not lay out an overarching mission for the agency and since that time Congress has not passed a comprehensive act outlining the mission and specific functions of the agency. In addition, in its Preliminary Report released in April 2004, the U.S. Commission on Ocean Policy strongly recommended that Congress pass an organic act for NOAA. H.R. 4546 responds to this Ocean Commission recommendation by providing an organic act for NOAA.

The Subcommittee heard testimony from: (1) The Honorable Theodore Kassinger, Deputy Secretary of the U.S. Department of Commerce; (2) Dr. James Baker, President and Chief Executive Officer, the Academy of Natural Sciences. Dr. Baker was Administrator of NOAA from 1993–2001; (3) Rear Admiral Richard West (Ret.), President, Consortium for Oceanographic Research and Education. Admiral West was a member of the subcommittee of NOAA's Science Advisory Board that recently reviewed NOAA's re-

search enterprise; (4) Dr. Elbert (Joe) W. Friday Jr., WeatherNews Chair of Applied Meteorology and Director, the Sasaki Applied Meteorology Research Institute, University of Oklahoma. Dr. Friday was the Assistant Administrator of the National Weather Service and the Office of Oceanic and Atmospheric Research at NOAA. Additionally, he is a Past President of the American Meteorological Society; and (5) Mr. Richard Hirn, General Counsel, National Weather Service Employees Organization.

Summary of Hearing

Mr. Theodore Kassinger began the hearing by acknowledging the importance of the organic act for the restructuring of NOAA, and highlighting areas where the Administration's bill, H.R. 4607, and the Committee's bill, H.R. 4546 differ.

- H.R. 4607 would codify the Agency's administrative authorities.
- In comparison with H.R. 4546, H.R. 4607 would provide the Agency with greater flexibility for reorganizing its structure and programs.
- While H.R. 4546 would establish a 15-member Science Advisory Board, H.R. 4607 would establish a broader-based Advisory Committee on Oceans and Atmosphere that would not only incorporate the functions of the current Science Advisory Board but also serve to advise the Administrator on a broader range of issues.

Dr. James Baker provided testimony on the current strengths and limitations of NOAA and how an organic act can help to ensure NOAA's future success.

- NOAA needs more recognition, support, money and independence. The organic act will enable the NOAA to better meet the Nation's changing needs through updating and clarifying its mission and structure.
- The organic act should seek to ensure the scientific independence of the NOAA, particularly on politically-sensitive issues such as global climate change and fisheries management. Additionally, NOAA should become an independent agency, like the EPA, as it has the maturity to become one.
- More support is needed for NOAA's educational outreach programs. The more the public is educated regarding NOAA issues, the better support NOAA will have when dealing with difficult issues.
- A provision should be added to Title I of H.R. 4546 to formalize the mechanism for research to be conducted and competitively funded at universities and research institutions outside NOAA.

Rear Admiral Richard West (Ret.) discussed the response of the science community to the NOAA organic act. He also briefly reviewed applicable recommendations from the NOAA Research Review Team report.

- One major problem with NOAA is that its research, operation, and regulatory bodies do not operate well under its

current integrated corporate culture. Another limiting factor is NOAA's placement within the Department of Commerce.

- The research plan set out in H.R. 4546 is important, especially because it recognizes the role of research in NOAA, establishes the goals and process for Agency-wide research and investments, and delineates the role of NOAA's external partners. The importance of peer review and competitive awards, improved processes for managing grants and contracts, and integrated research, education and outreach should also be emphasized in this plan.
- The creation of a Deputy Assistant Secretary for Science and Technology, who would be responsible for coordinating and managing the NOAA research enterprise, would provide clear recognition of NOAA as a science-based mission agency.
- A top national priority should be the development of an Integrated Ocean Observing System that extends from our watersheds to the outer edge of the exclusive economic zone.

Dr. Elbert (Joe) W. Friday, Jr. testified that an organic act should clearly identify research in support of NOAA's mission as a prime NOAA responsibility.

- The creation of the position of the Deputy Assistant Secretary for Science and Technology will benefit the NOAA through helping to strengthen the role of science within NOAA and providing NOAA with a credible science voice.
- NOAA's laboratory structure is absolutely critical to the successful modernization of the National Weather Service.

Mr. Richard Hirn discussed NWSEO's response to the NOAA Organic Act.

- The most pressing problem facing NOAA is not its organizational structure but the failure of successive Administrations and Congresses to adequately fund NOAA.
- The NWSEO supports granting distinct legislative authority for the National Weather Service, provided within Section 105 of the Chairman's bill and not in the Administration's bill.
- The consolidation of research and education into one branch of the NOAA's mission areas as highlighted in the Chairman's bill may actually result in an overall reduction in education and research. The NOAA's research and education functions should be closely integrated with, instead of separated from its operational role.

4.4—SUBCOMMITTEE ON RESEARCH

4.4(a)—The National Earthquake Hazards Reduction Program: Past, Present, and Future

May 8, 2003

Hearing Volume No. 108–14

Background

On May 8, 2003, the Subcommittee on Research held a hearing to examine the current status of the National Earthquake Hazards Reduction Program (NEHRP) in preparation for program reauthorization. NEHRP is a long-term, comprehensive, multi-agency earthquake hazards mitigation program established by Congress in 1977 to minimize the loss of life and property from earthquakes. Four agencies participate in this effort: the Federal Emergency Management Agency (FEMA), U.S. Geological Survey (USGS), National Science Foundation (NSF), and National Institute of Standards and Technology (NIST).

The witnesses were: (1) Mr. Anthony S. Lowe, Administrator, Federal Insurance Mitigation Administration; Director, Mitigation Division, Emergency Preparedness and Response Directorate (Federal Emergency Management Agency), Department of Homeland Security; (2) Mr. Robert A. Olson, President, Robert Olson Associates, Inc.; (3) Dr. Lloyd S. Cluff, Director, Geosciences Department and Earthquake Risk Management Program, Pacific Gas and Electric Company; (4) Dr. Thomas D. O'Rourke, President, Earthquake Engineering Research Institute (EERI); Thomas R. Briggs Professor of Engineering, Cornell University; and (5) Dr. Lawrence D. Reaveley, Professor and Chair, Department of Civil and Environmental Engineering, University of Utah.

Summary of Hearing

Much of the hearing testimony and discussion focused on leadership and coordination problems and challenges within NEHRP. Mr. Lowe testified that USGS, NSF, and NIST all had equal stakes in the program, and that the new strategic plan for the program should guide these efforts. He went on to cite some of the successes NEHRP has had in its 25-year history and present the program's strategic plan.

- Two notable accomplishments to come out of the program are: 1) a nationally applicable building standard that is used as the basis for the Nation's model building codes and 2) improvements in providing seismic design guides for the Nation's infrastructure (e.g., power and water transmission, bridges, and hospitals).

- Though many years overdue, Mr. Lowe was pleased to present the strategic plan for NEHRP that will allow it to further the program's goal of reducing earthquake loss. He also stated that with the strategic plan in place, it was important to now establish a management plan among NEHRP's lead agencies to provide the monies and control needed to execute the strategic plan and to provide recommendations to the Office of Management and Budget (OMB). Mr. Lowe has also asked for the development of an annual plan that would guide the program level personnel in their execution of the strategic plan. Mr. Lowe was confident these plans would allow for the careful monitoring of the program at the management level.
- Mr. Lowe supported the placement of NEHRP in the Department of Homeland Security (DHS) because DHS is an all-hazards organization as NEHRP should be.

Mr. Olson recently attended a forum with the four NEHRP agencies and the National Academy of Sciences in honor of the 25th anniversary of NEHRP. He testified about some of the concerns he heard raised at this forum. These included budget concerns—appropriations for the program have not kept up with inflation—and concerns about the leadership of the program being placed in such a new and expansive agency as DHS. He also stated that:

- We must find ways to speed up the rate at which knowledge is applied to the field. Past commitments to basic research are admirable and have lead to many successes, but there must be a better balance between investments in research and in improving applications.
- The Committee should create an independent panel to assess how the original NEHRP charter legislation might be changed to help reduce earthquake risk over the next 25 years.
- Because of advanced technologies and theories, it might be time now to revisit the idea of trying to predict earthquakes. Past investments in this pursuit have certainly paid off through improved forecasting abilities.
- Earthquake risk is increasing because of growing populations and little or no focus on hazard reductions in high-risk areas.

Dr. Cluff testified that the U.S. will face unacceptable and unavoidable deaths and economic losses if seismic safety is not given more priority in the 39 states that have significant earthquake vulnerability. He warned that earthquake risk continues to grow nationwide. This is largely due to (1) uncontrolled growth in earthquake-prone areas, (2) the lack of effective land-use planning in the hazardous areas, (3) the lack of implementation and enforcement of appropriate building standards, and (4) the high cost of strengthening the existing built environment. Furthermore, Dr. Cluff recommended:

- Full implementation of the USGS Advanced National Seismic System (ANSS)

- That the Subcommittee endorse the EERI report "Securing Society Against Catastrophic Earthquake Losses"
- That NEHRP use the placement of FEMA in DHS to make the program an all-hazards program

Dr. Cluff also described two examples of how NEHRP-style research programs are having risk mitigation benefits:

- A NEHRP-style study Dr. Cluff conducted on the Denali Fault led to protecting the Trans-Alaska Pipeline from rupturing due to a magnitude 7.9 earthquake in November 2002.
- A project to incorporate USGS shake maps with maps of Pacific Gas and Electric facilities and pipelines helps engineers locate problem areas in the event of an earthquake.

Dr. O'Rourke testified that the EERI believed strongly in maintaining a strong and viable NEHRP, and giving it increased funding in line with their recommendations. In addition, Dr. O'Rourke:

- Encouraged support for the ANSS, which will establish 6000 new monitoring stations, with a concentration around urban centers where the risk is highest. The ANSS will also provide shake maps that will give almost real time information on the severity of the earthquake.
- Made recommendations for leadership changes at NEHRP because each of the four participating agencies are in different departments and, therefore, their cooperation and communication is hindered. These include giving NEHRP designated staff in each of the four participating agencies and assigning an OMB examiner to ensure a coordinated NEHRP budget at the agencies. He also asked that the President create a panel of independent experts that would report to Congress biannually to oversee NEHRP.
- Presented EERI's 20-year Research and Outreach Plan called "Securing Society Against Catastrophic Earthquake Losses." This plan was reviewed and approved by the earthquake community and increases funding levels to $360 million, three times the current level. This is, however, still twenty times less than the annualized losses due to earthquake damage in the U.S.

Dr. Reaveley attributed most of the significant advances in structural engineering over the past 25 years to the NEHRP program. Further, from an economic standpoint, Dr. Reaveley believes it is advantageous to invest in making structures earthquake resistant because they also become blast resistant and wind resistant. He also listed the three projects he considered most important. They are:

- Strong motion networks in regions of high-probable ground shake because they advance the understanding of the behavior of structures and the physics of an earthquake.
- Performance Based Engineering should be the model for all NEHRP projects.

- Qualified personnel are needed at the local government level. Plan reviews and inspections must be done and are not, not even in areas of high seismic risk.

4.4(b)—Plant Biotechnology Research and Development in Africa: Challenges and Opportunities

June 12, 2003

Hearing Volume No. 108–16

Background

On June 12, 2003, the Subcommittee on Research held a hearing to examine plant biotechnology research and development activities relevant to African food crops and the challenges and opportunities involved in these activities.

The witnesses were: (1) Honorable J. Dennis Hastert, Speaker of the House, U.S. House of Representatives; (2) Dr. Rita R. Colwell, Director, National Science Foundation; (3) Honorable Andrew S. Natsios, Administrator, U.S. Agency for International Development; (4) Dr. Gordon Conway, President, Rockefeller Foundation; (5) Dr. John Kilama, President, Global Bioscience Development Institute; and (6) Dr. Robert B. Horsch, Vice President, Product and Technology Cooperation for Monsanto.

Summary of Hearing

Speaker Hastert represents the 14th District of Illinois, which includes parts of four of the top twenty-five corn producing counties and three of the top fifty soybean producing counties in the Nation. In addition, Illinois is the second largest producing state of both corn and soybeans. A high percentage of both of these crops are genetically modified (34 percent of U.S. corn acres and 75 percent of U.S. soybean acres are genetically modified). Speaker Hastert testified that though these crops are classified as genetically modified, farmers have always been modifying crops to improve yields and create more resilient varieties, and biotechnology is just the next step in this process.

Speaker Hastert criticized some foreign nations for implementing protectionist trade policy based on emotion, culture, or their own poor industry or history with food safety regulation and technology, not sound science. He also criticized the European Union for instituting a five-year moratorium on genetically modified foods even though European scientists consider them safe. Several countries have considered labeling genetically modified foods as such but Speaker Hastert warned that such a practice would mislead consumers and create an atmosphere of fear.

Dr. Colwell testified about the National Science Foundation's (NSF) long history of supporting collaborative research and how they are aiding plant genomics research. Though the NSF usually focuses its resources on funding U.S. scientists and institutions, it also partners with other agencies, such as the U.S. Agency for International Development (USAID), to develop programs in developing countries and with their scientists to contribute to capacity building. They base these programs on the NSF's principles of

quality, merit review, and the integration of research and education. She added:

- The NSF takes part in the National Plant Genome Initiative, which was established in 1998 and includes representatives from the Department of Agriculture, Department of Energy, National Institutes of Health, NSF, Office of Science and Technology Policy, Office of Management and Budget, and USAID. It is coordinated by the National Science and Technology Council's Interagency Working Group on Plant Genomes. This initiative has transformed U.S. plant research and has created a new generation of plant biologists.
- Paraphrasing Dr. Norman Borlaug, Nobel laureate and father of the Green Revolution, the world currently has, or in the very near future will have, the capability to feed on a sustainable basis 10 billion people. A revolution in plant genomics could lead to agricultural improvements that rival the Green Revolution and alleviate the suffering of millions of people.

Administrator Natsios testified that the agriculture budget at USAID dropped by roughly $1 billion between 1986 and 2001. As a result, Africa is the only place in the world where agricultural production has declined. The only way to reverse this trend is to devote more money to agricultural development, especially in biotechnology research to develop seed varieties appropriate for Africa. He went on to testify specifically about the food situation in Africa and about the barriers to implementation of genetically modified food.

- The African agriculture is the only agriculture in the world that has not experienced dividends from the Green Revolution. Only in the last decade has the Green Revolution begun to reach Africa, and this has occurred in the three countries that have received the most U.S. agricultural aid: Angola, Mozambique, and Uganda.
- There are several rumors intentionally being spread through African communities to generate fear of genetically modified food.
- Administrator Natsios also countered several criticisms of genetically modified foods, such as:
  - Biotechnology is diverting funds from other needed interventions. However, only $25 million of the total $300 million agriculture budget goes to biotechnology.
  - Accepting biotechnology crops will make African farmers dependent on multinational companies. However, USAID is working with African universities and research centers to move the biotechnology programs into Africa.
  - Biotechnology derived crops will adversely affect the environment. However, Administrator Natsios believes that the potential agricultural rewards are worth the risk.

- Accepting genetically modified food aid will hurt agriculture exports to Europe. The groups that raise this concern are not African, and Administrator Natsios was particularly distressed by the timing of this complaint, coming during a tremendous food shortage seven years after genetically modified food aid began arriving in Africa.

Dr. Conway testified for the Rockefeller Foundation, whose purpose is to improve the lives of poor and excluded people around the world. In fact, Dr. Borlaug was a staff member with the Rockefeller Foundation when he did his ground-breaking work that spawned the Green Revolution. He added:

- There are many reasons that per capita food production in Africa is decreasing, such as conflicts and disease, but also because the average yield on Africa farms is simply too low. The average yield on an African farm is the same as the yield on a European farm during the time of the Roman Empire 2000 years ago.
- The Rockefeller Foundation is trying to address two central questions: 1) how can we help poor, small holder, African farmers increase their food security, and 2) what tools can be made available to them to address the difficult challenges they face in producing a healthy harvest?
- Africans should have a choice as to which solutions they use to solve their agriculture problems. For this reason, the Rockefeller Foundation is trying to put African scientists and farmers in a position to use the new technologies for their own purposes. Western corporate ownership of a lot of the intellectual property is impeding this, however.
- It is more likely that improvements made in an applied setting in Africa will have a stronger impact than developments made in American laboratories.

Dr. Kilama stated that plant biotechnology has not been given a chance to succeed in Africa, and gave his recommendations for how it should be implemented. He testified that:

- A clear roadmap is needed that addresses the root causes of the crisis, rather than its symptoms. The roadmap should be made up of the following steps. Focus on financial support of the long-term strategic plan, not on making short-term investments. Revive and rebuild Africa's battered capacity for applied research. Focus on applied research to solve problems that Africans themselves identify as essential. Rebuild Africa's battered infrastructure for agricultural extension.
- Many African nations do not have the capacity to conduct advanced research. In the 1960's and 1970's, many nations spent at least one percent of their GDP on scientific research, but today most nations only spend 0.1 percent of their GDP on it. However, there are several universities and research institutes that are poised to fill the gap if funding were to increase.

- Biotechnology should not just exist in certain research centers that are far away from the population and less responsive. It should be instilled at the grassroots level.
- The NSF should encourage American university professors to spend time at African universities, just as African scholars have spent time in American universities.

Dr. Horsch testified for the Monsanto Corporation. Monsanto helps small farmers in developing countries gain access to better agricultural products, technologies, and research. Their presence in Africa is centered mainly in South Africa. He stated that:

- The biggest problems for Africa's agriculture are pests, depleted soils, drought, and poor human nutrition from inadequate completeness of diet.
- Some recommendations for improving Africa's agricultural situation are: strengthen U.S. investment in basic science and education; strengthen support for innovation and conservation; continue to support open trade policies and practices; reverse the declines in international agricultural development assistance; continue our leadership in science-based regulatory policies; and deliver public sector biotech products to subsistence farmers sooner rather than later.
- Interagency partnerships are essential for encouraging continued biotechnology research for Africa.

4.4(c)—H.R. 2183, Minority Serving Institution Digital and Wireless Technology Opportunity Act of 2003

July 9, 2003

Hearing Volume No. 108–20

Background

On July 9, 2003, the Subcommittee on Research held a hearing to examine the technology infrastructure needs of minority serving institutions (MSIs) and to consider H.R. 2183, the *Minority Serving Institution Digital and Wireless Technology Opportunity Act.*

The witnesses were: (1) the Honorable George Allen, U.S. Senate; (2) the Honorable Edolphus Towns, U.S. House of Representatives; (3) Dr. Frederick S. Humphries, President, National Association for Equal Opportunity in Higher Education; (4) Dr. Ricardo R. Fernandez, President, Herbert H. Lehman College-CUNY; (5) Dr. Larry L. Earvin, President, Huston-Tillotson College; (6) Dr. Dwight J. Fennell, President, Paul Quinn College; and (7) Dr. Rita R. Colwell, Director, National Science Foundation.

Summary of Hearing

Senator Allen testified that the purpose of the legislation was to increase access to technology and address the technological deficiencies that exist at minority serving institutions, as well as provide all young people with the tools for success in college and beyond. Currently, African-Americans, Hispanics, and American Indians represent 25 percent of the U.S. workforce but represent less

than 10 percent of the computer and information science and engineering workforce and computer science faculty. Senator Allen views this as an economic divide and hopes that the legislation will help fill this gap. He added:

- Though the use of H–1B visas to bring technical talent to the U.S. has been successful, there is enough talent in this country to fill those jobs if there was appropriate education and training.
- Some people have been interested in establishing a peer review process at the National Science Foundation but there is already peer review included in the legislation. Plus, there is also an advisory council established by the legislation.

Representative Towns spoke about the need for a peer review process in the legislation that includes representatives from MSIs and about the eventual placement of the program.

- Members of the MSI community are needed on any peer review panel that awards grants under this program because reviewers from large research universities are unfamiliar with MSIs. Statistics suggest that there is a need for this because only 1.3 percent of eligible National Science Foundation (NSF) monies went to historically black colleges and universities (HBCUs) in the year 2000.
- The Science Committee should strongly consider placing the program either in NSF or the Department of Commerce. It may be more beneficial to place it in the Department of Commerce because then it would not be limited to just academic enhancements for science research and development like it would in NSF.

Dr. Humphries recommended to the Science Committee that funding under this legislation be awarded annually instead of just for one year. To have a significant impact, each institution requires roughly $2.5 million, which with $250 million in total funding available only supports 100 institutions. To reach all of the MSIs, the funding will have to be awarded for multiple years. He added:

- Representatives from the MSI community should be included on all peer review panels that award funds to MSIs.
- This program should be housed in NSF because it will increase minority participation in NSF programs.
- Most HBCUs lack adequate infrastructure (e.g., Internet connections) and the human resources to support them. The two major components of this digital divide are (1) providing access to information technology, and (2) expanding the application and use of information technology.

Dr. Fernandez testified representing the views of Hispanic serving institutions (HSIs), which are institutions with a full-time equivalent Hispanic student enrollment of at least 25 percent. In addition to this, many HSIs have significant populations of other minority students. So any initiatives that aid HSIs also aid other minority populations. Dr. Fernandez called the legislation the most effective means to serve the urgent technology education needs of MSIs. In addition, he stated that three of the most important tech-

nology issues are a lack of an appropriate information technology infrastructure and equipment, a lack of a strategic information technology (IT) plan, and faculty development in the use of IT for teaching, learning, and research.

Dr. Earvin testified on behalf of the United Negro College Fund. He stated that many universities that provide access to post-secondary education to low-income students, especially minorities, must overcome both poverty and technological illiteracy in educating their students. Without federal assistance, they will not be able to continue with their mission. He also made three recommendations for the legislation. They were:

- Adopt a strong peer review provision to ensure that highly qualified persons who are both knowledgeable about and familiar with the technological infrastructure needs of HBCUs and MSIs, but also who are conversant with the academic programs and needs of these institutions, will evaluate all proposals to determine their merit.
- Evaluate carefully the agency best suited to house the program.
- Ensure that adequate reporting requirements are applied both to agency administration and institutional implementation of the program so as to guarantee the successful achievement of the legislation's goals.

Dr. Fennell stated that all higher education institutions must have, at a minimum, technologies that include desktop computers, connectivity with Internet access, and the ability to provide professional development. They also need to have a functional plan of action describing how to upgrade the campus environment, retain and retool campus constituents, and maintain vigilance about new technologies and their use. Dr. Fennell also made several recommendations for improvements in the legislation. They were:

- Allow for the provision of a process that provides for the receipt of funding that will be pertinent to any technology needs as identified by the institutions because, while institutions have comparable needs, they are not all the same needs in terms of technological advances.
- A peer review is critical and should include members of the MSI community.
- Allow for the provision of campus-wide opportunities in professional development and technical assistance.

4.4(d)—H.R. 2692, United States Fire Administration Authorization Act of 2003

July 17, 2003

Hearing Volume No. 108–22

Background

On July 17, 2003, the Subcommittee on Research held a hearing to examine U.S. Fire Administration (USFA) programs and activities and H.R. 2692, the *U.S. Fire Administration Authorization Act of 2003.* The USFA, housed within the Federal Emergency Manage-

ment Agency (FEMA) and located in Emmitsburg, Maryland, is charged with helping to prevent and limit fire-related losses. Its activities revolve around four primary areas: training, public education, research, and data collection and analysis. On March 1, 2003, USFA and FEMA officially became part of the Emergency Preparedness and Response Directorate of the Department of Homeland Security (DHS).

The witnesses were: (1) Honorable Dave Camp, U.S. House of Representatives; (2) Mr. David Paulison, U.S. Fire Administrator and Director, Preparedness Division of the Emergency Preparedness and Response Directorate/FEMA, Department of Homeland Security; (3) Dr. Arden L. Bement, Jr., Director, National Institute of Standards and Technology; (4) Mr. Dennis Compton, Immediate Past Chair, Board for the International Fire Service Training Association; and (5) Dr. John R. Hall, Jr., Assistant Vice President, Fire Analysis and Research, National Fire Protection Association.

Summary of Hearing

Representative Camp testified that the events of September 11, 2001 expanded the role of America's firefighters beyond just fighting fires. USFA in particular will have to take on additional roles as part of the Department of Homeland Security (DHS) in coordinating America's fire prevention and response activities and fire education. Representative Camp then described the major objectives of the *Firefighting Research and Coordination Act.*

- The bill focuses on establishing equipment and technology standards, and would allow the U.S. Fire Administrator, the National Institute for Standards and Technology (NIST), and other standards organizations to develop voluntary consensus standards for evaluating the performance and compatibility of new firefighting technologies. It also allows for the U.S. Fire Administrator to exercise some flexibility in the rare case when a newer technology is introduced that may make an existing voluntary consensus standard irrelevant.
- The bill addresses mutual aid systems, which are widely acknowledged as effective and efficient means of sharing emergency management resources among different jurisdictions.
- Lastly, the bill allows the Superintendent of the National Fire Academy to work with federal, State, and local officials to develop new curricula at the Academy.

Mr. Paulison testified on behalf of DHS. As U.S. Fire Administrator, he said his mission was to reduce the loss of life and property due to fire and related emergencies, which still kill or injure more Americans every year than all other natural disasters combined. He added:

- To accomplish this mission, USFA works closely with members of the fire services, other emergency responders, and state and local governments.
- To date, the Assistance to Firefighters grant program has received over $1 billion in funding, with $750 million being appropriated by Congress this year. These competitive grants

address training, safety, prevention, personal protective gear and other equipment, as well as fitness and wellness issues for local fire departments.

- One of the most significant issues still to overcome is interoperability of communications, equipment, operations, and training between fire departments. The Interagency "SafeCom" group at DHS has been established specifically to address this problem.

Dr. Bement spoke about NIST's role in improving the fire service and gave several specific examples of programs currently at NIST. He added:

- There is an urgent need for performance-based consensus standards and NIST is using its measurement science and technology expertise to aid in the effort to create them. Many new technologies do not have consensus standards, which forces fire departments to either assess the equipment themselves or rely on the manufacturers' information.
- NIST spends $8.4 million on fire research activities with another $2 million coming from USFA. Some of NIST's activities include research on passive and active fire protection technologies, portable thermal imagers, and more advanced graphic displays for fire alarm panels.

Chief Compton expressed his strong support for the USFA and commended it for how well it has served its core mission. He also recommended that the U.S. Fire Administrator maintain a prominent position in DHS and remain a Presidentially-appointed, Senate-confirmed position. Additionally:

- Chief Compton supported developing a national residential fire sprinkler strategy because the combination of fire sprinklers and smoke alarms in homes can significantly reduce the number of lives lost from fires each year.
- Credentialing of emergency responders is critical to the successful management of national emergencies.
- He also warned that transferring the Assistance to Firefighters grant program to the Office of Domestic Preparedness would diminish its effectiveness because the grants would first go to the states, which would then distribute them to the fire departments. He would prefer that the program keep its current structure under USFA where the grants go directly to the fire departments.

Dr. Hall spoke on behalf of the National Fire Protection Association, a non-profit organization founded over 100 years ago whose mission is to save lives through education, research, and the development of consensus codes and standards. He testified that reauthorization of USFA is critically important to the effectiveness of the fire service throughout the U.S. He added:

- Though over $1 billion in funding has been award through the Assistance to Firefighters grant program, over $7 billion has been applied for; additionally, the Council on Foreign Relations estimates that it will take $98.4 billion over the next five years to meet the needs of first responders, with

the fire service accounting for more than half of this amount. Therefore, Congress should fund the program at no less than the authorized amount of $900 million.

- The program should also remain under USFA so that fire departments can directly receive the grants without unnecessary red tape.
- All equipment purchased with grants from this program should meet or exceed applicable voluntary consensus standards. The national fire service organizations, including the International Association of Fire Chiefs, the International Association of Fire Fighters, and the National Volunteer Fire Council, support voluntary consensus standards whenever possible.

4.4(e)—Implementation of the Math and Science Partnership Program: Views From the Field

October 30, 2003

Hearing Volume No. 108–32

Background

On October 30, 2003, the Subcommittee on Research held a hearing to discuss the implementation of the Math and Science Partnership (MSP) Program at the National Science Foundation (NSF). The MSP Program, part of President Bush's No Child Left Behind initiative, was authorized by the House in last year's *NSF Authorization Act,* which was signed into law in December. The program provides grants to partnerships of universities and school districts (and sometimes businesses) to improve K–12 math and science education. This hearing will be the Congress's first look at how this major new initiative is working.

The witnesses were: (1) Dr. Osman Yasar, Principal Investigator, Targeted MSP grant, SUNY–Brockport; (2) Mr. Ed Chi, Science Teacher, Brighton School District, New York; (3) Mr. Jeff Mikols, Math Teacher, Rochester City School District, New York; (4) Dr. Susana Navarro, Principal Investigator, Comprehensive MSP Grant, University of Texas, El Paso; and (5) Dr. Joan Ferrini-Mundy, Principal Investigator, Comprehensive MSP Grant, Michigan State University.

Summary of Hearing

Dr. Yasar reported that his project involved integrating math, science, and computing in a unique way to pique student interest, and it has been very successful in creating enthusiasm both in students and teachers. This partnering of disciplines has been key to the project's success. Additionally:

- The project is a partnership between SUNY–Brockport and two New York School Districts, Rochester and Brighton, with assistance from the Shodor Education Foundation, the Krell Institute, Texas Instruments, and the Xerox Corporation. The results are disseminated to the local community with the help of the Monroe County School Boards Association and the New York State Education Department.

- The project achieves its goals through the use of professional development of teachers and faculty members by training and mentoring at SUNY–Brockport and through technology scholarships and stipends, team approaches, and peer networking.

Mr. Chi represented the views of participants in Dr. Yasar's program. He reported on the response from teachers involved in the program and on some of the student responses to the new teaching techniques.

- As a result of the new teaching techniques, students are beginning to see connections between math, science, and technology, which has excited and interested them. The simulation and modeling programs have put them in charge of their education, and because they now "own" their own education, they go beyond what they would typically learn.
- The program has made teachers feel as though they are on the cutting edge, which is inspiring and motivating them. There is long-term, continuous, open collaboration among the teachers that exposes them to new teaching styles and challenges them to hone existing skills and develop new ones.
- Two barriers to achieving the goals of the program are school administrations that are not as supportive as they should be and teachers who are not confident in their abilities to take on the new techniques.

Mr. Mikols also presented the views of participants of Dr. Yasar's program. He testified that technology is one tool that teachers can use to change the way that math and science are taught. Many students are inherently interested in technology and it lets them gather information, draw conclusions, and verify those conclusions in a much quicker way than ever before possible. He added:

- Students will achieve the most when they are pursuing topics that are directly relevant and interesting to them.
- Making teachers aware that other teaching avenues are available, and that change is necessary, is the first step towards improving math and science education. However, the greatest barrier to change is a lack of willingness among teachers to accept change.
- The program provides ongoing, year-round training to ensure that the professional development has long-lasting effects.
- The best way to get students to pursue careers in math and science teaching is to make them lovers of math and science at as early an age as possible.

Dr. Navarro's MSP program works in the El Paso, TX community to provide an opportunity for shared development and implementation of high quality practices aimed at improving academic achievement among all students. The El Paso community has seen dramatic improvements in the achievement gap and enrollment in college preparatory courses, as well as pass rates in these courses, since NSF-funded reform efforts began in 1994. In addition, she testified:

- The El Paso MSP has five key priorities: (1) increase and sustain the quality and quantity of pre-K–12 math and science teachers; (2) build the capacity of schools and districts to effectively support efforts to improve math and science teaching and achievement; (3) align curriculum instruction and assessment for students from kindergarten through university; (4) promote efforts to increase the percentage of students who go on to college; and (5) conduct research that advances knowledge and understanding about the systemic improvements of math and science teaching.
- The efforts for this program must extend from kindergarten through university and beyond to develop exceptional teachers.
- Course outlines should be developed that provide clear and specific information on math and science content at each grade level and performance standards.
- A full and robust set of support and assistance mechanisms is needed to build school capacity.

Dr. Ferrini-Mundy's MSP program hopes to improve K–12 math and science education through assessment of students and teachers, improvement of standards and frameworks, and the preparation and professional development of teachers. She added:

- The goals of the program are: (1) use empirical evidence as a basis for the efforts to improve math and science learning; (2) work with the partners to develop challenging content standards that will work to align instruction and assessment; (3) design professional development that helps all teachers teach to the high standards and that emphasizes subject matter knowledge; (4) rethink the ways in which future teachers are prepared to teach math and science; and (5) improve students' learning and achievement throughout the program.
- The standards and frameworks developed will emphasize significant ideas in math and science and are well articulated and convey high expectations for all students.
- The hope is to tailor the program's activities to local needs and provide professional development that enables teachers with differing needs to access it in individual ways.

4.4(f)—H.R. 3980, National Windstorm Impact Reduction Act of 2004

March 24, 2004

Hearing Volume No. 108–51

Background

On Wednesday, March 24, 2004, at 2:00 p.m., the Subcommittee on Research and the Subcommittee on Environment, Technology, and Standards of the Committee on Science of the U.S. House of Representatives held a joint hearing to receive testimony on H.R. 3980, the *National Windstorm Impact Reduction Act of 2004,* and to consider the role of federal research and development in wind-

storm hazard reduction. The hearing intended to build upon discussions from a February 9, 2004, Science Committee field hearing on windstorm hazards that was held in Lubbock, Texas.

The witnesses were: (1) Dr. John A. Brighton, Assistant Director for Engineering, National Science Foundation (NSF); (2) Mr. Anthony S. Lowe, Administrator, Federal Insurance Mitigation Administration, emergency Preparedness and Response Directorate, Department of Homeland Security; (3) Dr. Steven L. McCabe, Professor, Department of Civil, Environmental, and Architectural Engineering, University of Kansas; and (4) Mr. Jeffrey C. Sciaudone, Director, Engineering and Technical Services, Institute for Business and Home Safety (IBHS).

Summary of Hearing

Chairman Smith opened the hearing by noting that every state in the Nation is vulnerable to windstorms and that vulnerability is increasing because of rapid population growth in high-risk areas. Ms. Johnson speculated that the savings from reduced loss of life and property would have more than paid for the investment in research had a program for wind research been established at the same time as the successful program for earthquake preparedness research. Mr. Neugebauer and Mr. Moore, the sponsors of the legislation, both made opening comments on H.R. 3980. Mr. Neugebauer said that a National Academy of Sciences' review found a lack of leadership, focus, and coordination of wind hazard mitigation activities in the Federal Government and insufficient R&D funding. Mr. Moore emphasized that this is not a partisan issue but a human one.

Dr. Brighton testified that the bulk of NSF's work in windstorm hazards research occurs in three directorates: Social, Behavioral, and Economic Sciences; Geosciences; and Engineering. He also gave specific examples of ongoing NSF programs and added:

- NSF support of research centers has been very important to windstorm hazards research. NSF supports the Center for Analysis and Prediction of Storms at the University of Oklahoma in cooperation with the National Oceanic and Atmospheric Administration. NSF also supports the Center for Collaborative Adaptive Sensing of the Atmosphere at the University of Massachusetts at Amherst.
- NSF coordinates its activities with other federal agencies including the National Institute of Standards and Technology and the Federal Emergency Management Agency. They also coordinate their investment with the U.S. Weather Research Program.
- NSF has several concerns about the proposed legislation, including:
    1. The interagency working group proposed in H.R. 3980 is redundant with the existing mechanisms in the National Science and Technology Council that is working well.
    2. The National Advisory Committee on Windstorm Impact Reduction is redundant with the advice agencies

already receive through professional societies, meetings, and workshops.

3. NSF supports basic research, not research to address specific goals or priorities. NSF is concerned about the unintended consequences of codifying a research program into law.

Mr. Lowe testified that FEMA currently has several programs geared towards hazard mitigation, such as the National Earthquake Hazards Reduction Program, the National Dam Safety Program, and the National Hurricane Program. Each of these programs is leveraged to provide all-hazards mitigation. He added:

- Other than FEMA's National Hurricane Program, there is little coordinated effort among federal agencies towards addressing the effects of wind hazards.
- FEMA conducts post-disaster studies to determine how structures performed and to issue guidance on how to build more disaster-resistant structures.
- FEMA has developed several technical guidance documents and helped establish national standards for in-home and community shelters. Also, many states use FEMA's post-disaster Hazard Mitigation Grant Program to fund wind hazard shelters.

Dr. McCabe testified on behalf of the Wind Hazards Reduction Coalition and the American Society of Civil Engineers. He believes that the current $5–10 million federal investment in wind engineering research is not adequate given the $6 billion of damage suffered annually as a result of wind hazards. He went on to say:

- Two National Research Council reports recommend the establishment of a national program to reduce wind vulnerability and the funding of a coordinated national wind hazard reduction program made up of partnerships of Federal, State, and local governments, private industry, and the research community.
- There is a need to develop a greater understanding of severe winds and their impacts on the built environment, assess the performance of the built environment under severe winds, and transfer research results to the design and construction industries.
- The Wind Hazards Reduction Coalition has two concerns with H.R. 3980: (1) there is no new federal money authorized in the legislation and (2) the Coalition strongly supports the creation of a National Advisory Committee on Windstorm Impact Reduction.

Mr. Sciaudone testified that IBHS' windstorm impact reduction activities generally involve applying the results of R&D for consumers and insurers. They produce a number of consumer and insurer focus publications and interactive internet tools to explain windstorm mitigation. They are also involved in model building code development and building code adoption that encourages inclusion of mitigation research in building regulations. He added:

- The number one obstacle to convincing building owners to mitigate against windstorms is cost. Owners would prefer to spend that money on amenities people will enjoy every day. Cost is also the most used argument against implementing mitigation measures as part of building codes, but further data will justify the need to include them.
- Data on windstorm hazards is not easily obtained because extreme windstorms do not occur every day and always are unique when they do occur. Also, insurance adjusters do not always collect data useful for wind researchers.

4.4(g)—H.R. 4030, Congressional Medal for Outstanding Contributions in Math and Science Education Act of 2004

March 30, 2004

Hearing Volume No. 108–52

Background

On Tuesday, March 30, 2004, the Research Subcommittee of the Committee on Science of the House of Representatives held a hearing to examine the benefits of business involvement in math and science education and to consider H.R. 4030, legislation to establish the "Congressional Medal for Outstanding Contributions in Math and Science Education" program. The legislation seeks to recognize private entities for their outstanding contributions to K–12 science, technology, engineering and mathematics education.

The witnesses were: (1) Dr. Judith Ramaley, Assistant Director, Education and Human Resources Directorate, National Science Foundation (NSF); (2) Mr. Jay Engeln, Resident Practitioner for Business-School Partnerships, National Association of Secondary School Principals; (3) Mr. Torrence Robinson, Director, Federal Affairs, Texas Instruments; (4) Ms. Antoinette Bailey, Vice President, Community and Education Relations, Boeing Company; and (5) Mr. Gus Krudwig, Co-Founder, The Glou Factory.

Summary of Hearing

Chairman Smith opened the hearing by stressing the importance of encouraging and training students in math and science so they can be successful in the emerging competitive job market. He also stated that there is a significant increase in achievement in communities where business and industry have been more aggressive in supporting their schools and helping to stimulate education. Ranking Member Johnson added that she has always believed education must be the number one national priority.

Ms. Bailey testified that a skilled workforce is critical to the needs of technology companies like the Boeing Company and essential to the success of the U.S. economy in general. She believes it is imperative to align our educational system to fit the needs of producing the qualified workers of the future. She added:

- Technology companies like Boeing need employees with great math, science, reading, and communication skills. They also

need employees with systems integration and leadership skills as well as the ability to work cooperatively in groups.

- Boeing is committed to improving K–12 education. They have learned that to help improve K–12 education Boeing needs to (1) identify its strengths and weaknesses as a company and leverage their existing resources, and (2) make quality investments in education programs that have measurable results and are replicable and sustainable.
- One program they have developed is a series of posters entitled "Forces of Flight" that are designed to engage students and excite them about the mysteries of flight.

Mr. Engeln testified that the primary stakeholders in public schools are the students and parents, but local employers and businesses also have a vested interest in the success of the schools. He believes that partnerships with industry enhance the education experience for students by supporting teachers and providing additional resources. He added:

- School-business partnerships promote improved student achievement, reduce self-defeating behaviors amongst students, create better school environments, build stronger communities, and enhance property values. They provide schools with needed equipment and give students the opportunity to better understand possible career paths, which can be a strong motivator for students.
- Teachers also benefit from the partnerships because they feel their efforts are more appreciated, get additional resources, and are energized by the community support for their actions.
- Palmer High School, where Mr. Engeln is principal, saw increased test scores in math and science and improved performance at math and science fair competitions as a result of their partnership.

Mr. Robinson stated that America's economic and national security depend upon the future scientists, engineers, and mathematicians that give America a competitive edge, and believes that H.R. 4030 would raise the level of industry involvement in K–12 math and science education. He added:

- Texas Instruments (TI) approves of language in the bill that places priority consideration on programs that display improved student achievement, as that should be the ultimate goal of the program.
- In its K–12 activities, TI emphasizes developing and supporting programs that yield measurable results and are replicable.
- One of TI's successful programs has been the Infinity Project developed in collaboration with Southern Methodist University. It is a high school engineering curriculum that makes math, science, and engineering relevant to the students' lives. The project has resulted in increasing student interest in pursuing engineering in the future.

Dr. Ramaley applauds any actions that encourage and recognize the importance of private sector involvement in education as these actions will greatly benefit NSF's work to promote science, technology, engineering, and mathematics education. However, the Administration has several recommended changes for the legislation. They are:

- Expand the range of education levels from K–12 to pre-K through higher education, including community colleges, because all levels of education can benefit from these types of partnerships.
- Expand the types of eligible employers and organizations to include not-for-profits, local government entities, medical care providers, etc., to increase the diversity of the program.
- Be flexible with the timescale of the program because two years may not be long enough for a collaboration to mature and to demonstrate results.
- Appropriately fund the program. The program, by some estimates, will cost $750,000 per year.

Mr. Krudwig testified that the Glou Factory started about four years ago as a way to develop some basic skills that were seen as lacking in students in the Jackson, MI community. He added:

- The Glou Factory identified four needs in the Jackson community: (1) early vocational training and decision-making, (2) life skills, like problem-solving, critical thinking, and conflict resolution, to prevent unhealthy behaviors, (3) a skilled workforce that fulfills employment requirements, and (4) community service.
- Programs at the Glou Factory have some of the highest attendance rates in Jackson County, drawing as many as 240 students in a school year. A lot of these students are children that do not do well in traditional settings but can succeed in these programs.

4.5—SUBCOMMITTEE ON SPACE AND AERONAUTICS

4.5(a)—Space Shuttle Columbia

February 12, 2003

Hearing Volume No. 108–2

Background

On February 12, 2003, the Senate Committee on Commerce, Science, and Transportation held a joint hearing with the House Committee on Science, Subcommittee on Space and Aeronautics on the Space Shuttle *Columbia* Accident. The Committees heard testimony from NASA Administrator Sean O'Keefe regarding the accident, the investigation, and any related issues.

Summary of Hearing

At approximately 9:00 a.m. EST on February 1, 2003, the Space Shuttle *Columbia* broke apart during re-entry into the atmosphere while traveling at more than 12,500 miles per hour at an altitude of 207,000 feet. All seven astronauts were killed. Immediately following the accident, NASA activated a contingency plan to preserve all information related to this flight and established a Mishap Investigation Team to coordinate the identification, retrieval, and storage of debris and human remains. NASA also established the *Columbia* Accident Investigation Board (CAIB), and appointed retired Navy Admiral Harold (Hal) Gehman chair of the investigation Board.

The hearing focused on the potential causes of the accident, the efforts being made to identify those causes, and the methods by which NASA and the CAIB conducted the investigation—and to what extent the CAIB is sufficiently independent from NASA.

Additionally, Members sought to determine the potential impact that the grounding of the Shuttle Program would have on the International Space Station and other NASA programs, such as the Hubble Space Telescope. Members also inquired as to whether or not the Shuttle Program had been adequately funded in the past, what plans NASA has for a replacement vehicle, and whether or not the Shuttle design is unnecessarily unsafe.

Administrator O'Keefe gave an overview of the debris recovery efforts being made by NASA, the CAIB, as well as numerous other federal, State, and local entities. He also presented the preliminary findings relating to the events that preceded the accident, as well as the actions taken by NASA personnel agency-wide relating to STS–107.

4.5(b)—A Review of Aeronautics R&D at FAA and NASA

March 6, 2003

Hearing Volume No. 108–5

Background

On March 6, 2003, the Subcommittee on Space and Aeronautics held a hearing on the Fiscal Year 2004 budget request for aeronautics research and development programs at the Federal Aviation Administration (FAA) and National Aeronautics and Space Administration (NASA). The hearing explored each agency's strategic plan for aeronautics research, how well their plans aligned with their budget request and industry needs, and the coordination of research activities between FAA and NASA.

Witnesses included Dr. Jeremiah Creedon, Associate Administrator for Aerospace Technology, NASA; Mr. Charlie Keegan, Associate Administrator for Research and Acquisitions, FAA; Dr. R. John Hansman, Professor of Aeronautics and Astronautics, MIT; and Mr. Mac Armstrong, Senior Vice President—Operations & Safety, Air Transport Association.

Summary of Hearing

Members and several witnesses warned that "lackluster" funding of aeronautics research and development (R&D) could have significant consequences on the future of the aviation industry. Witnesses from NASA and the Federal Aviation Administration (FAA) faced tough questions about flat funding and budget cuts in this key area.

"Unfortunately, the budgets for NASA and the FAA clearly reflect a lackluster commitment to our future in aeronautics. In fact, NASA has cut funding for aeronautics research in half over the last ten years. . .meanwhile, FAA proposes only a modest increase in its program over the next five years," said Subcommittee Chair Dana Rohrabacher (R–CA). "Given the recommendations of *The Commission on the Future of the United States Aerospace Industry,* what is NASA's rationale for continuing to cut its aeronautics R&D program?"

Mr. Creedon defended the budget request, stating that NASA has increased funding for the development of technology in several key areas, including the Quiet Aircraft Technology (QAT) project.

Mr. Armstrong disagreed, noting that "actual budget authority for [QAT and NASA's Ultra Efficient Engine Technology program] has been less than half of what has been needed over the past few years." Mr. Armstrong added that it was a "significant NASA investment in the 1980s Energy Efficient Engine program, that developed the base technology in today's modern engines. Without a similar level of investment in R&D funding and support from NASA and FAA, it is unlikely that we will develop a new generation of aircraft that are significantly quieter and more environmentally friendly."

"If NASA is not willing to be supportive of one of its core missions and continues to either flat fund or reduce the development

of aeronautics technology, Congress is going to have to take action," said Representative John Larson (D–CT). "Along with Mr. Forbes and Mr. Weldon I have a bill that will re-commit NASA to its core mission of improving aviation in this country. The U.S. is the number one innovator of aviation technologies in the world and it has been for a century. Its not becoming number two on my watch."

Chairman Rohrabacher stated that we must also examine whether the NASA and FAA programs "are properly focused and relevant to national goals and objectives. Preserving our aerospace industry's edge against fierce international competition will require greater emphasis and attention to these goals." Echoing Rohrabacher's concerns, which were also outlined in the *Commission* report, Mr. Armstrong noted that "we must be concerned about the global competitiveness of the U.S. aviation sector. Cuts in NASA and FAA R&D budgets in the U.S. have been met with increases in the R&D budgets of our competitors."

Members and witnesses also expressed concerns about aviation gridlock—a repeat of the late 1990s when the air traffic control infrastructure was struggling to accommodate growth in traffic demand. "The NASA and FAA research programs dedicated to the National Airspace System (NAS) are clearly relevant but also clearly inadequate to meet the expected demand," said Mr. John Hansman. Mr. Armstrong noted that the FAA's Operational Evolution Plan "will only add 30 percent improvement in capacity by 2012, while the number of flights are predicted to increase by 50 percent." To cope, Mr. Armstrong urged the development of a highly automated system to replace the current "human centered and human constrained" system.

Mr. Hansman concluded, "the U.S. has not kept pace and is under-invested in fundamental and high risk research to develop the disciplines and people to shape aeronautics in the future.. . .I believe we do not fully appreciate the importance and dependence of air transportation to economic health and quality of life both in the U.S. and throughout the world."

4.5(c)—NASA's Integrated Space Transportation Plan and Orbital Space Plane Program

May 8, 2003

Hearing Volume No. 108–18

Background

On May 8, 2003, the Subcommittee on Space and Aeronautics held a hearing on NASA's Integrated Space Transportation Plan (ISTP) and Orbital Space Plane Program (OSP). Topics included the proposed ISTP architecture and OSP requirements, including NASA's development strategy for the OSP, plans for risk reduction and technology demonstrations, as well as the proposed schedule and total cost of the OSP program.

Witnesses included the Honorable Frederick D. Gregory, Deputy Administrator of NASA; Dr. Jerry Grey, Director of Aerospace and Science Policy for the American Institute of Aeronautics and Astronautics (AIAA), a member of the Science Council of the NASA Institute for Advanced Concepts, and Visiting Professor of Mechan-

ical and Aerospace Engineering at Princeton University; the Honorable Dale D. Myers, President of Dale Myers and Associates; and Dr. Michael Griffin, President and Chief Operating Officer of In-Q-Tel.

Summary of Hearing

Citing a lack of specific goals and a broad vision, Members expressed frustration over NASA's proposed new ISTP and OSP. They also echoed witness' concerns that the current plan gives the U.S. few capabilities above what is currently available and will come at an undetermined cost.

"In light of NASA's track record for developing space transportation systems, I welcomed the restructuring of the Space Launch Initiative as a positive step towards making good on the promise of cheap, reliable, and safe access to space," said Subcommittee on Space and Aeronautics Chairman Dana Rohrabacher (R–CA). "As we begin to peel back the layers, however, NASA's proposed plan appears to be just another initiative that is long on promises and short on likely results. That simply won't cut it any more with this subcommittee."

Dr. Griffin testified, "The proposed ISTP can only be seen as far too conservative. It is not so much wrong, as it is incomplete. If fully realized, it would leave us with little more capability than we have today to go beyond Earth orbit. It would do nothing soon to reduce the cost of space access. It would saddle us for the next two decades with continued primary reliance on the Shuttle, which is by any reasoned measure the riskiest element in the system. Surely we can do better."

Rep. Joe Barton (R–TX) called on NASA to cease flying astronauts in the Space Shuttle and use its resources to focus on future vehicles. "It's my opinion that we can't make the existing orbiter as safe as it needs to be," said Barton. "I think we ought to scrap that program. I think we ought to spend the money on building the best technology orbiter or space plane that we have. If it takes ten years to do it, so be it. We put a man on the Moon between 1961 and 1969 in the Apollo program. We certainly have the technology to do something similar today, if we were to decide we want to put the resources into it."

In lieu of manned Shuttle missions, Barton questioned whether NASA could modify the Shuttle to be an autonomous vehicle to fly unmanned cargo delivery missions. Dr. Grey testified that it is technically feasible since nearly 98 percent of the Shuttle's flight was automated already. As a cargo delivery system, the Shuttle could be operated at a far reduced cost, Grey added.

Members also expressed skepticism over NASA's plans for a crew return vehicle. Under the ISTP, the Orbital Space Plane is scheduled to provide crew return capabilities by 2010, however, the Russian Soyuz commitment ends in 2006. When questioned on how NASA planned to bridge the gap, NASA Deputy Administrator Fred Gregory told the Subcommittee that an agreement had been reached with international partners that the Russians would continue to provide crew return capabilities for three astronauts in Soyuz vehicles until the U.S. could take over. Mr. Dale Myers testified on his team's assessment that crew return and crew transfer

using an Apollo-derived concept with a Command and Service Module, warranted serious detailed study. He added that it could be a favored approach in any eventual plan to return to the Moon.

4.5(d)—U.S.–Russian Cooperation in Space

June 11, 2003

Hearing Volume No. 108–25

Background

On June 11, 2003, the Space and Aeronautics Subcommittee held a hearing on *U.S.–Russian Cooperation in Space.* The hearing explored the benefits and risks of U.S.–Russian cooperation on space programs. Specifically, the hearing reviewed Russia's participation in the International Space Station (ISS) program and the Russian Space Agency's (RSA) ability to provide near-term and long-term support for the ISS with Soyuz and Progress space vehicles. Members examined how NASA has interpreted Section 6 of the *Iran Nonproliferation Act (INA) of 2000,* how the INA has affected U.S.–Russian space collaboration, and how INA policies have influenced Russian nonproliferation. In addition, the hearing also reviewed other areas of technical collaboration in space between the U.S. and Russia and how best to organize these collaborations between government and industry.

Witnesses included Mr. John Schumacher, Assistant Administrator for External Relations, NASA; Mr. Robert M. Davis, President and CEO, California Space Authority; and Mr. Henry Sokolski, Executive Director, The Nonproliferation Policy Education Center. Ambassador Steve Pifer, Deputy Assistant Secretary of State, Bureau of European and Eurasian Affairs, Department of State was invited but did not attend.

Summary of Hearing

Members sought to identify the impact of the *Columbia* accident on our relationship with Russia and learned that Russia would continue to fly Soyuz missions through the fall of 2003 in order to maintain operations on the ISS, however, NASA's plans after that remain vague. Mr. Shumacher testified that if the Russians are unable to contribute Soyuz and Progress vehicles after their current commitment, NASA planned to turn to its other international partners. Pressed further by Ranking Member Bart Gordon, Shumacher was unable to provide specific details of how future missions might be funded saying, NASA would seek "some form of funding, either with other partner contributions or us and we would have to come forward to you for relief on the Act [Iran Nonproliferation Act of 2000] should that ever be the case."

Ranking Member Bart Gordon (D–TN) added, "It's clear from today's hearing that there are still many unanswered questions about how NASA intends to ensure that the Space Station can continue to operate next year if the Shuttle fleet is still grounded as most expect. NASA needs to step forward with some clear contingency plans."

NASA is prohibited from giving funds to Russia for ISS under the *Iran Nonproliferation Act of 2000* and Members echoed support

for the nonproliferation goals in the law. Mr. Sokolski, who's testimony concentrated on the proliferation aspects of U.S.–Russian cooperation, went further asking, "Is keeping the Space Station's schedule on track (even though we've already let it slip year after year) and on budget (even though we've already paid billions and billions over the project's original cost estimate) a priority that should now trump our security and that of millions of people who live down range from Iran's missiles?"

Mr. Davis's testimony focused on the relationship between U.S. commercial interests and what impact the Iran Nonproliferation Act has had on the U.S. aerospace industry.

4.5(e)—Commercial Human Space Flight

July 24, 2003

Hearing Volume No. 108–26

Background

On July 24, 2003, the Senate Science, Technology, and Space Subcommittee and the House Subcommittee on Space and Aeronautics held a joint hearing entitled *Commercial Human Space Flight.* The hearing examined barriers to investing in entrepreneurial space ventures. Topics included the market potential of space tourism, regulatory issues, private sector vehicle technology development, and capital investment considerations.

Witnesses included Mr. Phil McAlister, Director of Space and Telecommunications Industry Analysis Division at the Futron Corporation; Mr. Dennis Tito, founder and CEO of Wilshire Associates, Inc.; Mr. Elon Musk, founder and President of SpaceX Inc.; Mr. Jeff Greason, co-founder of XCOR Inc.; and Jon Kutler, Chairman, CEO, and Founder of Quarterdeck Investment Partners, LLC.

Summary of Hearing

An emerging demand for commercial human space flight has attracted the interest of a number of space tourism entrepreneurs and prompted concerns regarding regulation of this new industry. Witnesses testified on future opportunities for space travel, as well as issues surrounding government regulations and passenger liability for this new frontier of tourism.

Space and Aeronautics Subcommittee Chair Dana Rohrabacher (R–CA) said, "Opening space to those willing to pay for the experience of it offers our industrial-base a new source of technical innovation well beyond government's sphere of activities. Simply put, by building and flying space launch vehicles, commercial space entrepreneurs have overcome a barrier that apparently continues to plague NASA's bureaucratic inertia."

"Commercial human space flight may be an idea whose time is about to come," added Space Subcommittee Ranking Member Bart Gordon (D–TN). However, if it is to succeed, industry and government need to enter into a serious dialogue on the issues of appropriate safety standards and the extent to which it is appropriate for government to indemnify the companies against the consequences of launch accidents."

Mr. McAlister emphasized a positive outlook for space travel, based on a recent survey Futron conducted of affluent Americans. "Futron's forecast for suborbital space travel projects that by 2021, over 15,000 passengers could be flying annually, representing revenues in excess of $700 million," McAlister said.

Also testifying was the first space tourist in history, Mr. Tito, who said that his opinion of the commercial space industry has changed after "talking to thousands of people who want to fly into space." He even told Senate and House Members that he would "quite possibly" invest in a reusable launch vehicle company, but added that government regulation could dilute investment opportunities.

Regulation of reusable launch vehicles (RLVs) complicates the industry, however. The Federal Aviation Administration's (FAA) Aircraft Certification and Regulations Office (AVR), which regulated the commercial airline industry, and the Associate Administrator for Commercial Space Transportation (AST), which regulated traditional rockets, both claim jurisdiction over commercial space flight regulation.

Rohrabacher noted, "Unfortunately, a major barrier for new space launch ventures is the uncertainty in the government's ability to create a stable regulatory environment. It is clear the future of space commercialization hinges on the Federal Aviation Administration's ability to resolve the issue of how to regulate commercial human space flight operations. In my view, the Federal Government has the power to promote investor confidence by providing clear regulatory guidelines for commercial space transportation operators, or strangle the baby in the cradle."

Witnesses seemed to agree that commercial human space flight should not be regulated as stringently as regular commercial flight in the aerospace industry. Mr. Musk suggested that the government "adopt a nurturing and supportive approach to new launch vehicle developments," and "recognize the early and experimental nature of the industry." Mr. Musk, as well as Mr. Greason addressed the burden imposed on them. Barring excessive government regulation, both expect to fly paying passengers to space within three to five years.

Members at the hearing stressed safety and questioned the government's role in liability protections. Mr. Tito explained that a repeated demonstration of successful flight would establish a record of safety. Mr. Greason added, "it is safe enough when customers start showing up." Witnesses also agreed that to get the industry off the ground, potential customers would have to waive all claims of liability against the companies taking them to space.

Finally, the industry entrepreneurs expressed a desire for Congress to indemnify the companies against the consequences of launch accidents, similar to the indemnification it currently provides the U.S. space transportation industry. Mr. Kutler provided suggestions on how the government can increase research and development in the space industry with the "dual use" of supporting government programs as well as private industry.

4.5(f)—H.R. 3245, Commercial Space Act of 2003

November 5, 2003

Hearing Volume No. 108–33

Background

On November 5, 2003, the Subcommittee on Space and Aeronautics held a hearing to address the legal, regulatory, and public policy ramifications of H.R. 3245, the *Commercial Space Act of 2003,* for the emerging commercial human space flight industry. H.R. 3245 would regulate and license domestic commercial human space flight through the Associate Administrator for Commercial Space Transportation (AST) within the Federal Aviation Administration (FAA). The bill also would provide government indemnification to commercial human space flight providers for certain liabilities incurred from launch mishaps.

This hearing examined the relative merits of regulating commercial human space flight through the AST, or the FAA's Aircraft Certification and Regulations Office (AVR), or through another government office and, by extension, the manner in which experimental launch vehicles should be regulated. The hearing also addressed the merits of providing indemnification to commercial human space flight ventures. The government already offers indemnification to traditional commercial space transportation ventures, such as satellite launch operations.

Witnesses included Henry Hertzfeld, Senior Research Staff Scientist, Space Policy Institute Center for International Science and Technology Policy, George Washington University; Raymond Duffy, Jr., Senior Vice President, Willis InSpace Insurance Underwriters; Pamela Meredith, Counsel, Zuckert, Scoutt & Rasenberger, LLP, as well as Adjunct Professor of satellite communications and space law, American University, Washington College of Law; Gary Hudson, Chief Executive Officer, HMX Inc.; and Michael S. Kelly, Technical Manager, Northrop-Grumman/Xon Tech.

Summary of Hearing

Witness testimony focused on the message that commercial human space flight (space tourism) is a burgeoning industry in need of some degree of government regulation and oversight. Witnesses varied widely, however, on the extent of regulations and the need for government indemnification of space tourism launches.

Space Subcommittee Chairman Dana Rohrabacher (R–CA) said, "I believe space entrepreneurs provide a beacon of hope for our troubled space transportation industry by introducing innovative concepts. However, bureaucratic red tape simply can't be allowed to impede the growth of such promising industries. As Ronald Reagan observed when signing the first Commercial Space Act twenty years ago, 'we need to cut real red tape to see blue sky.'"

Rep. Rohrabacher's legislation, H.R. 3245, would clarify the legislative framework for commercial human space flight. The bill ensures that commercial launchers—such as those being built by entrepreneurs to take people to the edge of space—would also be reg-

ulated by the Federal Aviation Administration (FAA) Office of Commercial Space Transportation (AST).

Subcommittee Ranking Member Bart Gordon (D–TN) added, "Today's witnesses have given us a great deal of food for thought. The approach we take towards regulation of the emerging commercial human space flight industry will have a big impact both on its future viability and on the safety of the flying public. We need to get it right, and this hearing is an important first step."

Much of the debate centered on the indemnification against losses caused by commercial human space flight launches. The government currently insures non-human launches, and Ms. Meredith saw no need to draw a distinction between manned and unmanned flights. "There appears to be no reason to treat a human space flight differently than unmanned flight as far as indemnification of the licensee and its contractors, subcontractors, and customers and the customers' contractors and subcontractors are concerned," Ms. Meredith said. She added that indemnifying passengers and crew depended on a larger liability plan for the industry.

Mr. Duffy disagreed, arguing, "It would not be appropriate for the government to extend any protection to these people. If someone is willing to participate in commercial human space flights at this stage of its development then the risk should be dealt with solely between the passenger and the launch provider."

Witnesses also differed on the appropriate federal office for implementing regulations over the industry. Mr. Kelly testified that AST was the correct authority. "The extent of that regulation, however, should not reach beyond AST's charter of protecting the lives and property of uninvolved parties."

Mr. Hudson disagreed saying, "AST is not up to the challenge of this development." Hudson called for the "disestablishment of AST, and the elimination of the need for U.S. persons to seek 'launch licenses.'"

Mr. Hertzfeld noted that there is often a conflict between promotion and regulation—roles proposed for FAA. "I believe the time has come to separate these activities," Hertzfeld said. "Promotion of U.S. industry has traditionally been the province of the U.S. Department of Commerce. If the DOT/FAA is to regulate space without conflict, the promotional activities should be transferred elsewhere."

4.5(g)—NASA–Department of Defense Cooperation in Space Transportation

March 18, 2004

Hearing Volume No. 108–49

Background

On March 18, 2004, Subcommittee on Space and Aeronautics held a hearing on cooperation between NASA and the Department of Defense (DOD). The hearing examined current and historical examples of NASA–DOD cooperation and reviewed areas of launch development that should remain the exclusive responsibility of one agency or the other. The hearing also addressed how DOD and

NASA could encourage the growth of the U.S. domestic launch market.

Witnesses for the hearing were Rear Admiral (Ret.) Craig Steidle, NASA Associate Administrator for the Office of Exploration Systems; Major General (ret.) Robert Dickman, Deputy for Military Space in the Office of the Under Secretary of the Air Force; the Honorable Ron Sega, Director of Defense Research and Engineering; and Mr. Elon Musk, Chief Executive Officer of Space Exploration Technologies (SpaceX).

Summary of Hearing

Witnesses were generally positive about the potential for, and history of, NASA–DOD collaborations, but acknowledged the failure of a number of recent collaborations, including the X–37 space test vehicle and the National Aerospace Plane, which have been canceled.

Witnesses stressed that certain projects are inappropriate for NASA–DOD collaborations, particularly those involving weapons systems, which would compromise NASA's position as a civilian entity. Major General Dickman also pointed out that, because military bases on the Moon are prohibited by international treaty, NASA must undertake such a projects without DOD collaboration.

Mr. Feeney asked witnesses what payoff the President's Vision for Space Exploration was likely to have for national security. Witnesses provided few specifics, but agreed that the increased emphasis on space exploration will encourage students to pursue science and engineering, leading to advances in a variety of technical fields that would benefit national security.

Chairman Rohrabacher also asked witnesses whether the development timeline for the Crew Exploration Vehicle (CEV), scheduled for its first crewed orbit in 2014, is reasonable. Mr. Musk agreed with Chairman Rohrabacher's impression that the flight would be achievable considerably sooner than that date, particularly if it were contracted to smaller entrepreneurial companies in the private sector. Rear Admiral Steidle responded, however, that the proposed CEV timeline reflects the development of "something beyond just a spacecraft," including support systems and infrastructure not accounted for by Mr. Musk.

Mr. Lampson also asked the witnesses what they felt were the biggest impediments to productive NASA–DOD partnerships. Major General Dickman responded that, although there is no impediment to developing basic technology, NASA and the DOD's different vehicle requirements make it difficult for the two organizations to share launch vehicles. Witnesses agreed that both NASA and DOD leadership must also be dedicated to cooperation. Mr. Feeney asked witnesses to identify specific redundancies in the certification requirements, and Chairman Rohrabacher asked that those responses be made in writing.

4.5(h)—Lunar Science and Resources: Future Options

April 1, 2004

Hearing Volume No. 108–53

Background

On April 1, 2004, the Subcommittee on Space and Aeronautics held a hearing on the suitability of the Moon for long-term scientific and commercial activities. A long-term human presence on the Moon is a primary component of the President's Space Exploration Initiative, announced January 14, 2004. The initiative does not specify particular science or technology goals for the mission, however. The purpose of the hearing was to develop these specifics by analyzing the Moon's potential as a base for space science research, including radio, infrared and optical telescopes, and our ability to use *in situ* resources for further exploration.

Witnesses for the hearing were Dr. Paul Spudis, Senior Staff Scientist at the Johns Hopkins University Applied Physics Laboratory and Visiting Scientist at the Lunar and Planetary Institute; Dr. Daniel F. Lester, Research Scientist at the McDonald Observatory of the University of Texas at Austin; Dr. Donald Campbell, Professor of Astronomy and Associate Director of the National Astronomy and Ionosphere Center (NAIC) at Cornell University; Dr. John S. Lewis, Professor of Planetary Sciences and the Co-Director of the Space Engineering Research Center at the University of Arizona; and Dr. Timothy Swindle, Professor of Geosciences and Planetary Sciences at the University of Arizona.

Summary of Hearing

Witnesses agreed that more research is necessary to determine whether the Moon could produce enough water to support a long-term human presence. Witnesses recommended detailed mapping surveys to determine the location, volume, concentration and accessibility of ice and hydrogen (which could be combined with oxygen to produce water) on the Moon.

Though witnesses said the Moon may contain recoverable stores of elements like oxygen, silicon, titanium, aluminum and calcium, Dr. Lewis was pessimistic about the economy of such lunar mining, saying in his statement, ". . .the cost of retrieval of lunar materials is certain to be very high, rendering the return of almost any lunar-derived product to Earth prohibitively expensive."

The witnesses agreed that helium-3 is the most promising output of lunar mining. Present on Earth only in vanishingly small concentrations, helium-3 could be a fuel source for fusion reactors. Such reactors have been in development since the 1960's, however, and are not yet a viable technology. Witnesses agreed with Chairman Rohrabacher's assessment that ". . .helium-3 has no value now and we are only talking about something that has value. . .if we can perfect fusion energy."

Dr. Lewis was critical of the idea of using the Moon as a base of operations for Mars missions: "[T]he use of lunar-derived propellants, whether oxygen extracted from iron-bearing minerals. . .or hydrogen and oxygen made from polar ice, to support expeditions

to Mars makes no logistic sense. The Moon is not 'between' Earth and Mars; it is a different destination, poorly suited to function as a support base for travel to Mars." Dr. Lewis argued that the fuel saved by refueling a Mars-bound craft at fueling station in orbit around the Moon is negligible; a direct flight to Mars would use an equal amount of fuel.

Witnesses also stated that advances in space-based telescopes negate most of the advantages of hypothetical Moon-based instruments. Dr. Lester said, "[T]he opportunities for lunar-based astronomy offer much less value, compared to observatories in free space, than had been anticipated several decades ago."

Though witnesses were critical of the Moon's commercial value and its value as a base for telescopes or Mars-mission operations, they agreed that the Moon is a scientifically valuable object and that crewed or robotic expeditions to locations such as the Aikin Basin could make unique contributions to our understanding of the early solar system and the evolution of the Earth.

4.5(i)—NASA Contests and Prizes: How Can They Help Advance Space Exploration?

July 15, 2004

Hearing Volume No. 108–66

Background

On July 15, 2004, the Subcommittee on Space and Aeronautics held a hearing to examine how NASA could use inducement prizes to spur innovation. The report of the President's Commission on Implementation of United States Exploration Policy, issued in June, recommended that NASA offer such prizes, and NASA has requested permission to begin a small prize program and is seeking legislative authority to run an expanded program.

Witnesses for the hearing were Rear Admiral Craig E. Steidle (Ret.), Associate Administrator at NASA for Exploration Systems; the Honorable Robert Walker, Chairman of Wexler and Walker Public Policy Associates and former Chairman of the House Science Committee; Dr. Peter Diamandis, Chairman of the X Prize Foundation; and Dr. Molly Macauley, economist and Senior Fellow with Resources for the Future.

Summary of Hearing

Members and witnesses expressed support for the creation of new inducement prizes, which they said would encourage innovative thinking and technological breakthroughs, while spreading development costs among the competing teams. They disagreed, however, on how and by whom the prizes should be managed.

Chairman Rohrabacher suggested the creation of a National Endowment for Space Technology and Innovation, specifically charged with offering and awarding prizes. Admiral Steidle and Dr. Diamandis disagreed; Admiral Steidle argued that the prizes should be overseen by NASA's Centennial Challenges program, while Dr. Diamandis advocated a partnership between NASA and a private foundation. "NASA money could be matched 4:1 with outside capital," he said. Dr. Macauley, on the other hand, argued that

a NASA-administered prize would carry an unnecessary regulatory burden.

Witnesses largely agreed that the prize-giving body should not require contestants to follow safety regulations beyond those required by law. "You ought to make certain that you have the kind of mechanisms that permit people to take a substantial amount of risk," said Mr. Walker. Dr. Diamandis agreed, explaining that the X Prize requires that teams "abide by all local, regional and federal rules," but places no additional safety regulations on the contest.

Ms. Jackson Lee expressed concern about how prizes would affect minorities and women. ". . .All I can see is the private prize," she said, "which again would be self-contained, dominated by people who are already in the field, and if you will, excluding by being a very select and exclusive club.. . ."

The witnesses responded that, though a prize could not deliberately address issues of diversity, it would encourage "non-traditional" contractors. Dr. Diamandis argued that a prize "flattens the playing field" and "encourages the non-traditional, smaller groups to get involved, the ones with the ideas that are really innovative that would never see the light of day."

Witnesses also stressed that prizes were not suited to all situations. According to Dr. Holtz-Eakin, "they are most effective in situations that are characterized by great uncertainty about how to literally get from point A to point B." Dr. Macauley also told Members that prizes are "not a silver bullet," and should be seen as a complement to existing approaches. Similarly, Mr. Lampson said that prizes "should be not viewed as a substitute for adequate and sustained investment by the Federal Government in aeronautics and space R&D."

APPENDIX

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE
SUITE 2320 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-6301
(202) 225-6371
TTY: (202) 226-4410
http://www.house.gov/science/welcome.htm

March 5, 2003

The Honorable Jim Nussle
Chairman
Committee on the Budget
U.S. House of Representatives
Washington, DC 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 108th 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 2004.

Sincerely,

SHERWOOD BOEHLERT
Chairman

SLB/jrd
Enclosure

Cc: The Honorable Ralph M. Hall
The Honorable John M. Spratt, Jr.

VIEWS AND ESTIMATES
COMMITTEE ON SCIENCE FOR FISCAL YEAR 2004

BACKGROUND

Science and technology are the keystones of our economic prosperity and national security.

Economists attribute much of the Nation's improvement in productivity in recent years to the fruits of research and development (R&D)—and that productivity improvement fueled the longest period of economic expansion in our nation's history.

Advancements in science and technology were also critical to the Nation's ability to triumph in the Cold War. (Indeed, Cold War-era investments in science and technology, especially those made in the wake of the Soviet launch of Sputnik, laid much of the foundation for the broad, successful scientific and engineering enterprise the U.S. boasts today.) New ideas, understandings and technologies spawned by research and development are likely to be just as essential to winning the war against terrorism.

Moreover, science and technology have the potential to cure numerous domestic and global social ills—disease, poverty, hunger, cultural isolation and environmental degradation, to name just a few.

But advances in science and technology do not come cheap or without focused effort; nor are they solely the responsibility of the private sector. Throughout our history, and especially in the years since World War II, the Federal Government has played a fundamental role in underwriting research and development, especially (but not exclusively) basic research at the Nation's universities. This investment, which has a long history of bipartisan support, has paid off with handsome benefits for all Americans.

While the percentage of national R&D sponsored by the Federal Government has declined in recent years, the federal role remains essential. Indeed, as competitive pressures have led many industrial enterprises to focus research on projects with shorter-term benefits, longer-term research depends more than ever on federal support.

None of these assertions is new or unfounded. They are, for example, discussed in the Committee's report *Unlocking Our Future: Toward a New National Science Policy,* prepared by Congressman Vernon Ehlers, at the request of the Speaker, in the 105th Congress.

INTERAGENCY AND HOMELAND SECURITY ISSUES

In the first session of the 108th Congress, the Science Committee will focus on homeland security issues, including cyber security, the establishment of the new Department and the impact of security concerns on the conduct of research; reauthorization of the Nation's space and aeronautics programs and the investigation into the disintegration of the Space Shuttle *Columbia;* and oversight of the Department of Energy and the development of the research title for a comprehensive Energy Bill. Many of the Committee's concerns and interests in these and other areas are captured in the agency-by-agency discussion in the next session. But three sets of central concerns that cut across agency lines need to be reviewed first.

Presidential Initiatives

The Administration's budget highlights five "multi-agency R&D priorities" and provides a precise budget breakdown for three of them—work on networking and information technology, nanotechnology, and climate change. (Analytical Perspectives, p. 185) The Committee strongly endorses these initiatives, and agrees that they deserve priority in funding.

The Administration proposes a six percent increase from the Fiscal Year (FY) 2003 request for the interagency program on Networking and Information Technology (NITRD). The Committee believes this is the minimum the program needs.

The Administration proposes increasing spending on nanotechnology by ten percent. This promising, broadly applicable technology field merits the additional spending. The Committee plans to report out authorizing legislation for the nanotechnology initiative (H.R. 766) later this spring.

The Administration proposes spending about $1.75 billion on climate change science, an amount equivalent to FY03 enacted levels. The Committee believes this is an adequate investment in this important research. The Committee supports the proposal to dedicate $182 million to the Climate Change Research Initiative (CCRI), compared to last year's $40 million request. However, the Committee notes that much of the increase appears to be the result of the reclassification of several ongoing research programs.

The Committee commends the Administration for working to develop a strategic plan to guide all federal research activities regarding climate, including the CCRI. The Committee plans to work with the Administration to complete the plan this year and ensure that areas of climate research the plan identifies as priorities receive adequate funding.

The Committee also endorses the two other multi-agency R&D initiatives, which relate to combating terrorism, which is mentioned in the next section; and to education, some of which is discussed in the section on the National Science Foundation.

Homeland Security

The Committee played an active role in drafting the legislation that established the Department of Homeland Security (DHS), particularly in creating the Science and Technology Directorate and in outlining the Department's role in cyber security.

The Committee is therefore pleased that R&D to combat terrorism is one of the top priorities in the Administration's FY04 budget proposal. The FY04 budget request includes an estimated $3.2 billion across all agencies for homeland security R&D, including over $900 million for R&D within DHS—almost one-third more than was requested in FY03 for R&D by the agencies being transferred into the new Department.

Most of the R&D funding for DHS ($803 million) will go to the Under Secretariat for Science and Technology, including $350 million for the Homeland Security Advanced Research Projects Agency (HSARPA).

The Under Secretariat for Science and Technology is unusual among the divisions of DHS in that its mission and responsibilities require new capabilities that cannot be met by the programs and agencies being transferred into it. Perhaps more than any other part of the department, the challenge will be to build a division with greater capability than the sum of its individual pieces. Ultimate success will depend on careful planning and the investment of significant new resources.

While the Committee is generally supportive of the scale of the proposed budget for DHS, the Administration has not yet provided enough information to fully evaluate the proposed budget, despite repeated requests dating back several months. Important questions remain regarding the new Department's R&D agenda and how it will be carried out.

The Committee is concerned that the primary early focus of DHS R&D will be on development, with basic research comprising only five percent, or $47 million, of the DHS R&D request. More information is needed on the R&D agenda both within and outside the Department to determine if this is adequate, especially given the proposed cuts in basic research at the Department of Defense.

The Committee is also concerned that the proposed budget fails to adequately address the Nation's critical needs for cyber security R&D. The President's National Strategy to Secure Cyber Space tasks DHS with the responsibility to conduct research and development to reduce the vulnerability of our nation's computer networks. Nowhere, however, is this responsibility noted in the proposed budget.

Balance in the Federal Research Portfolio

While the Committee believes that the Administration has chosen the appropriate priorities for the federal R&D budget, it is nonetheless concerned that the biomedical sciences, in general, and the National Institutes of Health (NIH), in particular, continue to dwarf the remainder of the R&D budget. While the budget documents acknowledge the need to increase support for the physical sciences, the proposed spending levels would not allow that to occur, especially when compared to the enacted levels for FY03.

Similarly, while Defense Department development programs are critical to our national security, those programs alone cannot create a stable and secure American society or even ensure our protection from enemy attacks over the long-term. Yet while the Pentagon is slated to receive a 12 percent increase, basic and applied research in the Defense Department would decrease substantially from FY03 requested levels.

RECOMMENDATIONS FOR AGENCIES

SUBCOMMITTEE ON ENERGY

Department of Energy (DOE)

The Committee has jurisdiction over DOE's non-military national laboratories, civilian energy research, development, and demonstration programs, and commercial application of energy technology activities.

The Committee strongly believes that the Administration's FY04 budget request for DOE's Office of Science, which funds 40 percent of the Nation's physical science research, is inadequate. The budget proposes funding the Office at $3.3 billion, essentially the same level provided by the Omnibus Appropriations for FY03. This is significantly less than the $3.8 billion the House conferees proposed providing to the Office for FY04 in last year's comprehensive Energy Bill (H.R. 4). The proposal also falls short of the goal of the President's Council of Advisors on Science and Technology (PCAST), which recommended in its 2002 report that the FY04 budget request begin bringing funding for the physical sciences into parity with that of the life sciences.

The Committee is particularly concerned about the future of the Office of Science's user facilities and academic research. In recent years, funding limitations have forced many user facilities to restrict the number of hours they are available to researchers, causing investments that have cost taxpayers billions to sit idle. In addition, many DOE facilities are deteriorating and staff are nearing retirement, producing a looming problem that the Committee believes must be addressed with increased resources.

The Committee supports the inclusion of $12 million in the Office of Science request for the United States to rejoin international negotiations aimed at building ITER, a burning plasma physics experiment intended to lead eventually to the development of fusion as a commercially viable energy source. The Committee also supports the request for $64 million, also within the Office of Science, for nanoscale science including funding for instrumentation and construction of several nanoscale research centers. The Committee is concerned, however, that without an increase in the Office of Science's total budget, existing programs will be cut to provide the necessary increases for these new initiatives.

The Committee strongly supports the President's initiative calling for America to lead the world in developing hydrogen-powered automobiles and the necessary fueling infrastructure to support them, although many details have not yet been determined. The Committee is pleased that the Administration has requested $273 million for hydrogen technology programs, a 50 percent increase over FY03 enacted levels.

The Committee is concerned, however, that the proposed increases in hydrogen programs would come at the expense of much of the rest of the R&D funded by DOE's Energy Efficiency and Renewable Energy (EERE) account. For example, biomass R&D, which is crucial to curbing the use of petroleum and other fossil fuels and improving our energy security, would be cut significantly under the budget proposal. The Committee believes that the EERE account should be increased so that increases for the hydrogen initiative do not come detract from other programs.

The Committee supports the Administration's request for an increase in support for nuclear energy science and technology programs. Developing technologies that can reduce the volume and long-term toxicity of high-level waste from spent nuclear fuel and reduce the threat of proliferation is necessary if the Nation is to continue to rely on nuclear power. The Committee is concerned, however, about the drastic cuts proposed for the nuclear energy research initiative (NERI), which funds innovative, peer-reviewed nuclear research at universities and has been the source of new ideas for improving the safety and performance of nuclear energy.

The Committee needs more time to review the request for the Fossil Energy Research and Development program. The proposed request appears to fall significantly below the enacted levels for FY03. The Committee continues to support the Clean Coal program with the requirements that were included in the House-passed version of H.R. 4 in the last Congress.

Finally, the Committee supports the proposal to spend $1.6 billion for climate change technology development and $40 million for competitive grants to develop and deploy technologies that reduce or sequester greenhouse gases. The Committee awaits details on the program to ensure that federal dollars are being well spent to develop and commercialize advanced technologies that can help mitigate global climate change.

The Committee notes that the Department of Energy has also committed to completing a strategic plan for all the government's efforts to develop climate change technologies, similar to the plan for federal climate research, within the year. The Committee plans to work with the Administration to ensure that the plan is on time and that the areas of climate technology the plan identifies as priorities receive adequate funding.

SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY AND STANDARDS

Environmental Protection Agency (EPA)

EPA's Office of Research and Development carries out 80 percent of EPA's R&D activities, and receives a majority of the funds available in the agency's science and technology (S&T) account. While the Administration's proposed budget for S&T at EPA of $731 million is nine percent above its FY03 request, it is only 1.5 percent above FY03 enacted levels. The Committee believes that an increase in funding for EPA's S&T activities is warranted, especially in light of the across-the-board green progress ratings EPA has earned on all five of the President's management initiatives.

The Committee is pleased that the Administration is seeking funding for the Science to Achieve Results (STAR) Fellowship program, which it had proposed to eliminate in the FY03 budget request. However, the Committee believes the program should be funded at $10 million, the level enacted for FY03.

The Committee supports EPA's request for increased funding for improving Computational Toxicology, (which helps reveal the sequence of events by which chemicals can cause adverse effects in humans) and the Integrated Risk Information System (which provides critical human health information that enables health-based decision-making). The Committee also supports EPA's proposed increase in funding to study risks in sensitive populations such as the aged. Finally, the Committee again supports EPA's proposed new investments in homeland security for drinking water systems, for implementation of training and technical assistance as required by the Bioterrorism Response Act, and for rapid risk assessment.

National Oceanic and Atmospheric Administration (NOAA)

The proposed budget would increase NOAA's funding by $172 million, or about 5.5 percent, above the FY03 enacted level. The Committee supports this overall level of funding for NOAA.

The Committee is pleased that the request for NOAA includes funding for the National Sea Grant College Program. The Administration had proposed in its FY03 request to transfer the program from NOAA to the National Science Foundation. The Committee led an effort to reform the program by making more of its funding merit-reviewed and competitive. The Committee's reforms were included in the reauthorization that passed Congress and was signed by the President last fall.

The Committee supports NOAA's request for an increase of $17 million for climate change research, observations and services for a total of $296 million. Both the scientific community and the Administration have identified these three areas as high priorities. Included in this amount is $41.6 million specifically for NOAA's activities under the President's Climate Change Research Initiative (CCRI), which is intended to reduce scientific uncertainty and provide policy makers with useful information regarding climate change.

The Committee strongly supports the $5.5 million request for new funding to upgrade the current NOAA Weather Radio system. The increase will be used to fully automate NOAA Weather Radio and broaden its capabilities to become an All Hazards Network, allowing local emergency management officials to send information and warnings to the public for any hazardous situation, not just weather emergencies. The expansion will greatly improve our nation's ability to respond to any emergency, including terrorist attacks.

The Committee is pleased the Administration has requested an increase of $40 million NOAA's new satellite program (NPOESS) for a total of $277 million. This project, which is jointly funded by the Air Force, is vital to our future ability to forecast extreme weather. However, the Committee is concerned that this increase may not be enough as the total request for NPOESS (NOAA and Air Force) is $50 million less than what is called for in NOAA's NPOESS planning documents. The Committee is also concerned about NOAA's current and future capability to utilize, manage, and store all the satellite and weather data that are critical for forecasting and research. The Committee will continue to work with the General Accounting Office to ensure NPOESS is able to fulfill its mission and that NOAA makes progress on solving its satellite data management problems.

Department of Commerce—Technology Administration

The bulk of the Technology Administration's funding goes to the National Institute of Standards and Technology (NIST), the Nation's oldest federal laboratory, which has consistently provided high-quality research in a wide variety of fields including homeland security, nanotechnology, health care, building science, and computer security. The Administration proposes to spend $387.6 million for the core NIST laboratory functions (the Scientific and Technical Research and Services account) in FY04—an increase of $28.2 million, or eight percent, over FY03. The Com-

mittee is pleased with this request, and in particular supports the new initiatives in nanotechnology and homeland security for which the Administration has requested funding. However, the Committee believes that more funding should be provided to NIST to implement the significant new responsibilities Congress has recently given it. Specifically, the Committee believes NIST should be provided an additional $47 million to implement the Cyber Security Research and Development Act and $10 million to implement the Help America Vote Act, both of which were enacted during the last Congress.

The Committee is also pleased with the Administration's proposed construction and maintenance budget for NIST of $69 million. The budget request provides funding to undertake much needed improvements at NIST's laboratory in Boulder, Colorado. Above all, however, the Committee wants to ensure that the new Advanced Measurement Laboratory in Gaithersburg, Maryland is completed as soon as possible. NIST's FY03 appropriation did not provide enough funding to keep this facility on schedule for completion by the end of 2003. If no additional funding can possibly be provided for its completion this year, the Committee recommends additional funding for FY04.

The Committee takes issue with the proposal to virtually eliminate funding for the Manufacturing Extension Partnership (MEP), which helps smaller manufacturers modernize to remain competitive. In FY00 alone (the most recent year for which data is available), the program contributed $2.28 billion in new or retained sales, $480 million in cost savings, and $873 million in new capital investments. The proposed budget would end federal support for almost all state MEP centers. This change would force most centers to shut their doors just as they could be contributing to economic recovery.

The Committee continues to support the Advanced Technology Program (ATP) and is disappointed that it is phased out in the Administration's budget. The Committee remains willing to work with the Administration on the ATP reform package it sent to Congress late last year.

National Technical Information Service (NTIS)

The Committee looks forward to working with the Administration to keep NTIS functioning as a self-sustaining entity.

SUBCOMMITTEE ON RESEARCH

National Science Foundation (NSF)

The National Science Foundation (NSF) is the primary source of non-medical basic research conducted at colleges and universities. NSF funds basic research across nearly all disciplines of science and engineering, making NSF-supported research integral to progress in priority areas such as health care and national security, among others. In addition, NSF sponsors programs to improve K–12 and undergraduate education, and its fellowships and research assistantships support many graduate and post-doctoral students. The Foundation continues to receive high marks under the President's Management Reform Agenda. This year the Foundation received the only two "green lights" from the Office of Management and Budget (OMB)—one for financial management and the other for e-government.

The FY04 budget request for NSF is $5.481 billion, an increase of $452.9 million—or nine percent—over the FY03 request, but only three percent more than the FY03 appropriated level. As a result, when compared to the actual FY03 appropriated amounts, the high priority for NSF funding expressed in the President's budget (which was submitted before the FY03 appropriation was completed) fades to nearly flat funding when adjusted for inflation. Moreover, the FY04 budget request falls far short of the $6.39 billion authorized by the 107th Congress for NSF education and research activities in FY04.

The Committee believes that NSF should receive $6.390 billion in FY04, the amount authorized by the National Science Foundation Authorization Act of 2002 (P.L. 107–368). This request would increase funding for NSF's core science programs, such as information technology and nanoscale science and engineering research, and it would enable NSF to begin fully funding K–12 education programs and the large facility projects that have already been approved by the National Science Board.

Education and Human Resources

The Committee will continue to support education programs that improve student achievement and involvement in science, math, engineering and technology, and it will ensure that math and science education reforms, undertaken to fulfill the vision of the President's No Child Left Behind initiative, are grounded in sound science.

The Committee is pleased that the budget requests $200 million to complete the third year of funding for the Mathematics and Science Education Partnership Program. While the requested level is lower than the amount authorized last year by the National Science Foundation Act of 2002 (P.L. 107–368), it does restore recent funding cuts and it increases the overall level to accommodate the high number of quality applications.

The Committee appreciates the fact that the budget provides funding for the Noyce Scholarship Program and the Tech Talent Program (referred to as the Science, Technology, Engineering and Mathematics Talent Expansion Program, or STEP), but notes that the FY03 appropriated level now exceeds the FY04 request by $3 million and $15 million respectively. The Committee believes that the Noyce Scholarship Program should receive $20 million and the Tech Talent Program (or STEP) should receive $30 million, the amounts authorized under P.L. 107–368.

Finally, the Committee is pleased that the budget request for NSF's education programs increases the stipend level for graduate students in research or teaching fellowships from $25,000 to $30,000.

Federal Emergency Management Agency (FEMA)—United States Fire Administration (USFA)

The U.S. Fire Administration (USFA) was created in 1974 to aid localities in reducing the loss of life and property from fires and related emergencies. In 1979, USFA became part of the Federal Emergency Management Agency (FEMA), which, in turn, will be transferred on March 1 into the new Department of Homeland Security (DHS). USFA's Fire Prevention and Control activities, authorized at a level of $50.0 million for FY03, are due to be reauthorized this year. The FY04 budget request for these USFA activities has not yet been provided to Congress.

The Committee is concerned about the fate of non-homeland security activities transferred into the Department of Homeland Security, and is troubled by the lack of information regarding USFA fire prevention and control activities included in the budget justifications. The committee will carefully monitor the administration of these programs to ensure that they continue to be operated in an efficient and effective manner.

USFA has also administered the (separately authorized) Assistance to Firefighters Grant Program to provide direct assistance to local fire departments for training, purchase of equipment, and other purposes. The program is authorized at a level of $900 million for FY04. The President has requested $500 million, or $245 million less than the amount appropriated for FY03, for this program as part of the Administration's $3.5 billion counter-terrorism initiative within the Department of Homeland Security Border and Transportation Security Directorate's Office of National Preparedness.

The Committee is pleased that the budget requests a specific amount for the Assistance to Firefighters grant program (as opposed to zeroing out the program in favor of other first responder programs, as in the FY03 request) but supports the authorized amount for FY04 and is opposed to the transfer of the program out of the DHS Emergency Preparedness and Response Directorate where FEMA–USFA would administer it. The Committee believes that USFA, with its long history of working with America's fire services and demonstrated record of successfully implementing the fire grant program, is clearly the appropriate agency for administration of the program. The Committee also believes the focus of the program should remain on supporting basic firefighting needs, separate and distinct from other grant programs providing funds for terrorism incident response.

National Earthquake Hazards Reduction Program (NEHRP)

NEHRP is an interagency program led by FEMA that includes the National Science Foundation (NSF), the National Institute of Standards and Technology (NIST), and the U.S. Geological Survey (USGS). The program aims to reduce the loss of life and property from earthquakes by improving emergency response, increasing our understanding of earthquake risks, and improving earthquake engineering.

Most NEHRP activities, authorized at a level of $122.6 million for FY03, are due to be to reauthorized this year. Additional multi-year authorizations exist to operate the Advanced National Seismic Research and Monitoring System (ANSS, $35.0 million for FY04) and the George E. Brown Network for Earthquake Engineering Simulation (NEES, $17 million for FY04). The complete FY04 budget request for NEHRP has not yet been provided to Congress because of the delayed release of DHS–FEMA budget justifications. However, supporting agency levels have been provided: NSF, $45.0 million; USGS, $46.1 million; NIST, $2.5 million. The Committee is concerned about the fate of the NEHRP program as FEMA is transferred into the

Department of Homeland Security, and troubled by the apparent lack of coordination between NEHRP agencies in preparing the budget request. The Committee is also concerned that the request for the ANSS is only $2.0 million, less than five percent of the authorized level.

SUBCOMMITTEE ON SPACE AND AERONAUTICS

National Aeronautics and Space Administration (NASA)

The Administration has proposed $15.469 billion for NASA in FY04, an increase of less than one percent above NASA's FY03 appropriation of $15.335 billion. Unfortunately, as a result of the tragic loss of the Space Shuttle, it is impossible at this time to credibly assess the proposed funding levels contained in significant portions of NASA's FY04 budget request.

On February 1, 2003, the Space Shuttle *Columbia* was destroyed during re-entry and the seven astronauts on-board were killed. Following the accident, NASA grounded the Shuttle fleet indefinitely pending an investigation by a team of outside experts. Clearly, the accident and subsequent grounding of the Shuttle will have a significant effect on NASA's proposed FY04 budget request for the Shuttle program and the programs that rely on the Shuttle, specifically the International Space Station (ISS), and the ISS research program which is contained in the Office of Biological and Physical Research. In total, these programs account for approximately $6.6 billion of NASA's $15.5 billion budget. It is too early in the investigation to accurately predict what NASA's FY04 budget requirements will be for these programs.

The Administration is not expected to call for the construction of a new Shuttle Orbiter as was done to replace the *Challenger* in 1986 both because a fleet of three Orbiters is probably sufficient to complete the missions planned and because Shuttle manufacturing has been shut down for so long that it would be extremely difficult to restart it. However, as a result of the grounding of the Shuttle, NASA is studying alternatives to accelerate the development of an Orbital Space Plane (OSP) as part of the Space Launch Initiative (SLI). NASA's FY04 request for SLI is $1 billion and an acceleration of the program would likely increase the funding required for the program, but it is premature to predict whether NASA will propose an acceleration of the OSP and how that might affect the budget. The Committee plans to reassess all NASA human space flight programs as part of its investigation into the *Columbia* accident.

NASA hoped to achieve U.S. core complete assembly of the ISS by spring 2004 and have 12 research racks in operation. However, these plans are being re-assessed as well. Therefore, the Committee cannot adequately address whether the Administration's $1.71 billion FY04 budget request for ISS assembly and operations is justified. While the ISS has been an item of concern for the Committee, NASA has made significant progress this past year in establishing more credible cost estimates and management processes for the program.

The Administration requested $972 .7 million in FY04 for NASA's Biological and Physical Research program, which is a 6.5 percent increase over the FY03 request, as calculated using full cost. This budget reflects NASA's commitment to the Research Maximization and Prioritization (ReMAP) Task Force recommendations to increase the priority and productivity of science on the Space Station. NASA management should be commended for providing more stability to the Space Station research program. However, the loss of the *Columbia* and grounding of the Space Shuttle fleet will impact NASA's ability to conduct this research.

Three major NASA programs, Space Science, Earth Science, and Aeronautics are not directly affected by the grounding of the Space Shuttle fleet. The Administration's FY04 budget request for NASA's Space Science enterprise is $4.01 billion. The Committee strongly supports NASA's Space Science program and the Administration's request, including Project Prometheus for space nuclear power and propulsion systems, optical communications, and the Beyond Einstein initiative.

The Committee supports the Administration's request of $1.55 billion for NASA's Earth Science Enterprise and applauds NASA's work with the interagency climate change science program. However, the Committee is concerned that the Administration is requesting only $75 million in FY04 for NASA's Earth Science Application programs, despite its proven track record of high payoff endeavors, including improved weather forecasting, disaster management, terrain mapping, and aviation safety. The Committee is also concerned that the Administration is not adequately transitioning NASA's technology efforts, such as space radar and weather monitoring sensors, into operational capabilities.

The Administration's FY04 budget request for NASA's Aeronautics Technology program is $959 million, a one percent increase over last year's request. The Committee is concerned that the Administration has significantly under-funded research and development in aeronautics. Once a core program within NASA, the Adminis-

tration plans to cut an additional five percent from this program over the next five years, exacerbating a ten-year pattern of declining budgets at a time of growing need. These needs were highlighted in the Final Report of the Commission on the Future of the United States Aerospace Industry, a Congressionally-created commission chaired by former Science Committee Chairman Bob Walker. This report concluded: "As we approach the 100th anniversary of powered flight, the Commission urges the President and Congress to recognize a pressing national need, and powerful opportunity, and act now to create a 21st century air transportation system."

Federal Aviation Administration (FAA)

The Committee believes that the FY04 budget request for FAA's research and development is not adequate. The budget request appears to be $282 million, but is difficult to calculate because of the way it has been distributed across several accounts. The level of R&D investment falls far short of the funding required to maintain and to improve our air transportation system. The Committee looks forward to working with the FAA to ensure that R&D funding is commensurate to the challenges facing our air transportation system.

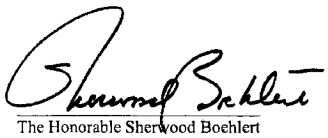
The Committee believes that the FY04 budget request of $12.6 million for the FAA's Office of Commercial Space Transportation (OCST) is more than is necessary to meet the projected demand for issuing commercial launch licenses and promoting the space transportation industry. The Committee urges the Office and the U.S. Air Force to develop streamlined safety regulations for U.S. launch operations that do not hinder the competitiveness of commercial launch providers.

Department of Commerce-Office of Space Commercialization

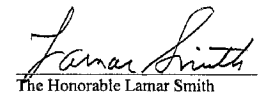
The Committee urges continued funding for this office at a level of at least $760,000 for FY04. In the past, the Office has played a useful role in promoting the commercial space industry and removing unnecessary impediments to the development of a robust and prosperous space industry. The Office needs to take a stronger role in legal and policy discussions within the government and be more aggressive in assisting U.S. commercial space providers in their efforts to conduct business with the government.

Committee on Science - FY 2004 Views and Estimates

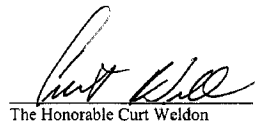
Member Signatures



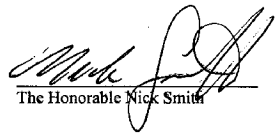
The Honorable Sherwood Boehlert
Chairman



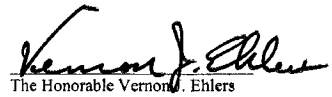
The Honorable Lamar Smith



The Honorable Curt Weldon

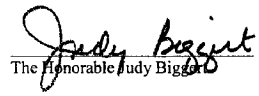


The Honorable Nick Smith

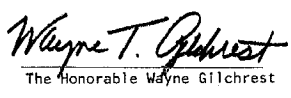


The Honorable Vernon J. Ehlers

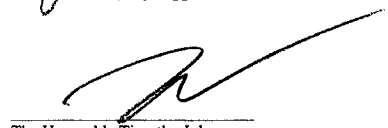
The Honorable George Nethercutt



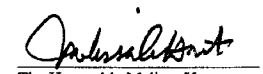
The Honorable Judy Biggert



The Honorable Wayne Gilchrest

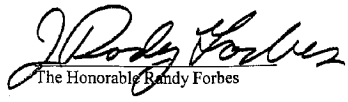


The Honorable Timothy Johnson



The Honorable Melissa Hart

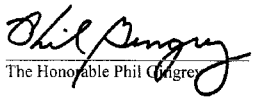
The Honorable John Sullivan



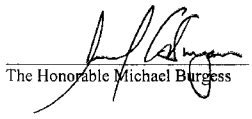
The Honorable Randy Forbes

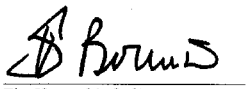
Committee on Science - FY 2004 Views and Estimates

Member Signatures


The Honorable Phil Gingrey

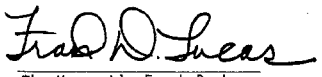

The Honorable Rob Bishop


The Honorable Michael Burgess


The Honorable Jo Bonner


The Honorable [illegible] Feeney


The Honorable Ken Calvert


The Honorable Frank D. Lucas


The Honorable Roscoe G. Bartlett

_____ _____

_____ _____

Committee on Science - FY 2004 Views and Estimates

Member Signatures

The Honorable John Larson

The Honorable Anthony Weiner

The Honorable Michael M. Honda

The Honorable Mark Udall

The Honorable Dennis Moore

MINORITY ADDITIONAL VIEWS
FY 2004 VIEWS AND ESTIMATES
TO THE HOUSE BUDGET COMMITTEE
MARCH, 2003

We generally agree with the policy guidance offered by the Majority in their Views and Estimates to the Budget Committee on the FY04 budget for civilian R&D. Those Views start with a global observation about the importance of adequate funding for science and technology, but the document is actually silent on what level of funding the Majority believes would be adequate. Instead, we are left with a collection of program-level recommendations done up department-by-department. That leaves us wondering what use the Budget Committee can put this document to as it looks for guidance on, for example, funding levels for Function 250 over the next five years. There is a fundamental disconnect between the purpose of composing Views and Estimates and the content of the Majority's report.

But this is nothing new. Each year for the past decade we have seen the Views and Estimates move further from their intended purpose of providing a solid, analytical, five-year recommendation to the Budget Committee. Many of our Members will sign on to the Majority's Views because the report does no harm, but the report also does no good by evading its central responsibility. Content is sacrificed in pursuit of unanimity.

We might make the same calculation were we charged with writing Views and Estimates because the budget process itself has become largely irrelevant. If the process is irrelevant, why make enemies and stir dissent by asking Members to sign up to big budget increases in S&T for the next five years (or cuts, or minimal increases—whatever poison you choose will simply divide Members)? The logic of the situation leads one irresistibly away from offering a clear-eyed vision of the S&T budget for the next five years and towards a detailed discussion of specific programs and initiatives. It is a kind of bad conjurer's trick to use lots of hand-waving about specific programs in hopes that no one will notice that the rabbit—a five-year projection—didn't disappear because it was never there in the first place. The whole exercise reminds us of the Committee's much-ballyhooed 1998 National Science Policy Study, which meekly called for "stable and substantial" funding for Federal R&D without actually committing to any specific funding recommendations. As pointed out by critics at the time, the "stable and substantial" criterion would be met by a budget that was slowly, steadily, inexorably declining over time.

In these additional views, we want to suggest an overall level of funding for FY 2004 for R&D and offer some observations on the use of metrics in the President's budget request and on earmarks in the budget process.

A Reluctant Recommendation

The Administration's overall request for R&D amounts to a 4.8 percent increase over the FY 2003 appropriated levels and yet that appears inadequate. Under the President's request, many programs would receive less funding in FY 2004 than in FY 2003. The Department of Energy's civilian research programs, the National Institutes of Standards and Technology, the National Oceanic and Atmospheric Administration, the Environmental Protection Agency and the Departments of Agriculture, Interior, Veterans Affairs, and Education would all be flat or face R&D cuts from the 2003 appropriated level if the President's request were enacted. Perhaps most tellingly, non-defense, non-NIH research in the President's budget grows by just 1.6 percent from the 2003 enacted level—below the level of inflation. It seems a mistake then to stay wedded to the President's numbers.

More than a mistake, it might be irresponsible. The reality is that the appropriators have been pushing for strong growth in R&D accounts; R&D increased by 13.8 percent from 2002 to 2003. On top of this, there is near unanimous agreement that the need for national security-related research continues to grow, and there is a consensus that we should be investing more in the physical sciences and in such areas as energy and environmental technologies. Further, while we can't say what impact the *Columbia* tragedy will have on NASA's budget, we can guess that more money rather than less will be needed at the agency. In light of these factors, it would seem reasonable to recommend an increase in the overall R&D funding in the eight percent to ten percent range compared to the FY 2003 enacted levels. It seems impossible to do the things we know we need to do in R&D with anything less than that, unless we are now willing to start sacrificing biomedical research. As to out years, we would like to believe that increases for security and physical sciences could decline slightly, say to the five percent to seven percent range in the four subsequent years.

Metrics in the President's Budget

The President's budget makes much of the effort to develop metrics for R&D programs. We fully support the effort to identify reasonable measures of performance for programs, both to give program managers useful tools for evaluating progress and to provide policy-makers in Congress and elsewhere with insight into the Administration's budgetary decisions. However, we remain skeptical that this Administration has demonstrated the utility of metrics in producing sound budgeting decisions. We also have limited confidence in the ability of OMB to know the difference between a good management criterion and a bad one—and the difference matters. Some have said that a bad number is better than no number at all. From our perspective a bad number, if used to guide budgetary decisions, can lead to terrible outcomes.

Judgment Is Required. For example, OMB's evaluation of the Space Shuttle program in the FY04 budget submission notes that the "Shuttle operational costs are rising" and that one of the goals for the program is "to help mitigate cost growth in Shuttle operations." But is the criterion of "mitigating cost growth" wise? Perhaps the wisest course would be to increase Shuttle costs, and quickly, in light of an overworked, depleted workforce. Absent in the program summary is any direct engagement with the central issue surrounding the Shuttle program even before the *Columbia* accident: is the program doing everything it should to ensure flight safety? That seems like an important metric and, given the costs of losing a Shuttle, an essential one, but it isn't represented in the OMB analysis. We are not suggesting that OMB is somehow to blame for the *Columbia* accident, just that what OMB counts matters to agencies and what OMB counts may not always be what an agency most needs to focus on.

Objectivity vs. Political Philosophy. We find programs that receive solid ratings in the OMB Metric effort but are canceled for other reasons. Thus the Manufacturing Extension Program at the Department of Commerce is proposed for phase-out despite having good scores on planning (86 out of 100), management (91) and results (80). Why? Because OMB doesn't believe the purpose of the program has been demonstrated—that the services provided to small manufacturers through MEP centers should be handled by the private sector. Perhaps OMB is right. Perhaps it is wrong. But the number given MEP for "purpose" (40) is based on faith and political ideology rather than objective measurement. The same is true for many other programs (Fossil Energy R&D and the Advanced Technology Program both come to mind). Canceling a program because you don't believe the government should do it is certainly defensible, but making this the most important criterion will always relegate managerial objectivity to a diminished role, if not irrelevancy.

Some Tactical Retreats. And then, for all the talk of metrics and management initiatives, one finds some retreat from the previous Administration in the use of objective numerical criteria. NASA's new strategic plan, which was released with the FY 2004 budget request, eliminates a number of quantitative performance objectives set by NASA in previous years. For example, in the late 1990s, NASA set an explicit aviation safety objective to guide its R&D efforts, namely *"Reduce the accident rate by a factor of five within ten years and by a factor of ten within twenty years."* In contrast, the new NASA strategic plan has changed the objective to *"Decrease the accident rate and mitigate the consequences of accidents.. . . "* In the area of air traffic management R&D, the previous objective was *"Double the capacity of the aviation system within 10 years and triple it within 25 years."* The revised objective is now *"Enable more people and goods to travel faster and farther, anywhere, anytime with fewer delays."* Perhaps the original numbers were too ambitious, but these sorts of applied R&D programs should be the easiest areas to develop reasonable measures of performance. So why have the numbers been dropped?

Metrics and Policy. Finally, an emphasis on program-level metrics without some broader awareness of how R&D policies fit together with and support other policies is a recipe for failure. In promoting the development and adoption of applied energy or environmental technologies, for example, supportive policies are needed to move innovations into broader use. Spending billions of dollars to enhance our understanding and encourage innovation in areas that will benefit the public is simply wasted if the knowledge stays bottled up or if innovations find no outlet through complementary policies. We see no evidence that the Administration's efforts at R&D metrics provide for integrated analysis of how to achieve broader societal goals for which applied R&D is but one component. For example, what regulatory and fiscal stimuli might be necessary to complement the President's hydrogen initiative in order to accelerate the transition to a hydrogen economy? How do these stimuli relate to the R&D program?

Summary of Metrics. In the end, the effort to utilize metrics will rise or fall on how it addresses the issues raised in this section. In the short run, the use of

metrics must at least result in clearer program goals and execution. The evidence is not entirely encouraging in this regard. The one area where the Administration seems to have worked the hardest to craft a coherent planning process has been in climate change R&D; however, according to a just released National Academy of Sciences evaluation, that draft plan "lacks most of the basic elements of a strategic plan: a guiding vision, executable goals, clear timetables and criteria for measuring progress."

Earmarks

The President's budget also makes much of earmarks in R&D accounts, arguing that one cannot measure the effectiveness of such expenditures, that higher priority work is crowded out through political favoritism, and that earmarks are distorting some programs (for example, NIST's construction account was heavily earmarked for non-NIST projects in FY 2002 and FY 2003 appropriations). We have some sympathy for OMB's objections and worry about the ability of some programs to carry out their missions. This committee has a long history of supporting NIST construction accounts—and of wondering why the Department of Energy should help build hospitals. However, we say to our friends at the other end of Pennsylvania Avenue that, if you don't like earmarks, don't fund them. Most earmarks do not exist in law. They are contained, by and large, in the detailed report language that accompanies appropriations bills. Report language is not binding on an agency. The ultimate responsibility for earmarks lies with the Administration that cuts the check. From a political perspective, we understand why no one in the Old Executive Office Building wants to start telling Appropriators they won't get their earmarks, but if you really believe them to be such a problem, perhaps you should swallow hard and start drawing lines in the sand. It is the kind of brave decision someone might make just before leaving town to run for Governor.

Hon. Ralph Hall
Hon. Bart Gordon
Hon. Nick Lampson
Hon. John Larson
Hon. Mark Udall
Hon. Mike Honda
Hon. Brad Miller
Hon. Chris Bell
Hon. Sheila Jackson Lee
Hon. Jerry Costello
Hon. Zoe Lofgren
Hon. Anthony Weiner
Hon. Jim Matheson
Hon. Brad Sherman
Hon. Lynn Woolsey
Hon. Lincoln Davis
Hon. David Wu
Hon. Eddie Bernice Johnson
Hon. Dennis Moore

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE
SUITE 2320 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-6301
(202) 225-6371
TTY: (202) 226-4410
http://www.house.gov/science/welcome.htm

March 3, 2004

The Honorable Jim Nussle, Chairman
Committee on the Budget
U.S. House of Representatives
Washington, DC 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 108th 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 2005.

Sincerely,

SHERWOOD BOEHLERT
Chairman

SB/jp
Enclosure

Cc: The Honorable Bart Gordon
The Honorable John M. Spratt, Jr.

VIEWS AND ESTIMATES OF THE
COMMITTEE ON SCIENCE FOR FISCAL YEAR 2005

BACKGROUND

As the House and Senate begin consideration of the President's Fiscal Year 2005 (FY05) budget request, there is no question that a great deal of debate will revolve around the budget deficit and its impact on the long-term economic health of the Nation. As these discussions move forward, the Science Committee urges Congress to recognize the importance and contributions of science and technology to productivity and economic growth—and consequently—fiscal security.

Indeed, nothing benefits federal revenues over the long-term as much as accelerated economic growth, and nothing fuels long-term growth more than science and technology.

Further, the strength of the U.S. scientific enterprise has long been a crucial component of America's national security. Advancements in science and technology were critical to the Nation's ability to triumph in the Cold War. (Indeed, Cold War-era investments in science and technology, especially those made in the wake of the Soviet launch of Sputnik, laid much of the foundation for the broad, successful scientific and engineering enterprise the U.S. boasts today.) New ideas, understandings and technologies spawned by research and development are just as essential to winning the war against terrorism.

As the President's Science Advisor Dr. John Marburger noted in testimony before the Science Committee, "This Administration understands that science and technology are major drivers of economic growth and important for securing the homeland and winning the war on terrorism." Department of Homeland Security (DHS) Under Secretary Charles McQueary echoed this sentiment at the same hearing, stating that "the Nation's advantage in science and technology is key to securing the homeland."

SCIENCE COMMITTEE AGENDA

In the second session of the 108th Congress, the Science Committee's top objective will be to lead efforts to evaluate and consider the President's space exploration initiative. The Committee's views on the initiative will be embodied in reauthorization legislation for the National Aeronautics and Space Administration (NASA). The Committee will also emphasize oversight of some of the key programs the Committee has helped put into place, including the work of the DHS Science and Technology (S&T) Directorate; important interagency R&D activities such as nanotechnology, climate change research, networking and information technology, and cyber security; and Department of Energy (DOE) R&D activities at the Office of Science. The Committee will also work to strengthen funding and activities at the National Science Foundation (NSF) and the National Institute of Standards and Technology (NIST). With regard to these agencies, the Committee notes particular priorities of preserving the Math and Science Partnerships program at NSF and ensuring that NIST has adequate funding to fulfill new responsibilities in areas such as the development of technical standards for voting machines.

OVERALL R&D FUNDING

Consistent with the President's overall FY05 budget request, the budget request for R&D primarily would increase funding for the Department of Defense (DOD) and DHS (7 and 15 percent, respectively). All other R&D receives an average increase of 2.3 percent. The R&D budget increases are almost entirely for development (8 percent), while basic and applied research are almost flat-funded (0.6 and 0.5 percent increases, respectively). The Committee believes the proposed funding for basic research is insufficient. Funding short-term development at the expense of longer-term basic and applied research is not advisable, and neglects those portions of R&D where government support is most crucial.

The Committee also believes that the budget must fully consider appropriate balances between defense and non-defense R&D spending and between biomedical and non-biomedical spending. At $69 and $29 billion, respectively, the R&D budgets of DOD and the National Institutes of Health (NIH) comprise 75 percent of the total R&D budget, including 93 percent of the FY05 increases (*Analytical Perspectives,* p. 59). While fully acknowledging the important contributions of these agencies, the Committee urges that similar attention be given to other important R&D agencies, such as NSF, DOE, and NIST.

INTERAGENCY ACTIVITIES

Presidential Initiatives

The Administration's budget highlights five "multi-agency R&D priorities" and provides a precise budget breakdown for three of them—work on networking and information technology, nanotechnology, and climate change. The Committee strongly endorses these initiatives, and agrees that they deserve priority in funding.

The Administration proposes a 2 percent increase from the FY04 estimated level for the interagency program on nanotechnology. This increase includes a 20 percent increase for nanotechnology programs at NSF, which is merited. Additional funds, beyond the administration's request, are needed for the nanotechnology programs at NIST and the DOE Office of Science.

The Administration proposes spending $2 billion for the interagency Climate Change Science Program, approximately the same as enacted in FY04. The Committee supports the proposal to dedicate $240 million to the interagency Climate Change Research Initiative, a 42 percent increase above the FY04 enacted level. This Initiative focuses on short-term results to support improved public debate and decision-making. However, the Committee notes that much of the increase for CCRI appears to reflect reclassification of ongoing research activities.

The Administration proposes a one percent decrease from the FY04 estimated level for the interagency program on Networking and Information Technology Research and Development (NITRD). This program includes important work on high-end computing and high-confidence software and systems, and the Committee believes that funding for work in this area should be raised, not lowered.

While cyber security R&D is not a formal Presidential initiative, significant effort is being put into programs in this area at a number of agencies. While the budget requests $76 million for cyber security R&D and education and training programs at NSF (up 19 percent) and $18.5 million for cyber security R&D at NIST (up 48 percent), this funding is still well below the levels authorized in the *Cyber Security Research and Development Act* (P.L. 107–305). In addition, within the DHS Science and Technology (S&T) Directorate, the FY05 budget requests only $18 million for cyber security R&D, the same level as in FY04. The Committee believes that increased funding for, and increased coordination of cyber security R&D programs are needed.

The Committee also endorses the two other multi-agency R&D initiatives, which relate to combating terrorism (discussed in the next section) and to hydrogen (discussed in the section on the Department of Energy).

RECOMMENDATIONS FOR AGENCIES

FULL COMMITTEE

Department of Homeland Security (DHS)

The Committee wrote the portion of the Homeland Security Act that created DHS's S&T Directorate. The Committee is pleased that the Administration has requested a 15 percent increase in funding for R&D in DHS.

Most of the requested R&D funding for DHS ($1.04 billion) is for the S&T Directorate, which receives a 14 percent increase. A significant part of the increase is directed toward operational expansion of the BioWatch system, which is designed to monitor major cities for biological agents. Funding for more basic research programs does not fare as well. The funding for University Programs decreases dramatically, from $69 million in FY04 to $30 million in FY05. The Committee is concerned that if DHS does not make and maintain investments in basic research, including research at universities and national laboratories, the next generation of homeland security technologies will not be available against the next generation of threats.

The FY05 budget request proposes to commence consolidation of the department's R&D programs into the S&T Directorate by transferring $24 million worth of R&D activities from the U.S. Coast Guard and from the Federal Air Marshal Service. The Committee is supportive of the consolidation, and looks forwarded to the remaining research programs in the Department being moved into the S&T Directorate.

SUBCOMMITTEE ON ENERGY

Department of Energy (DOE)

The Committee has jurisdiction over DOE's non-military national laboratories, civilian energy research, development, and demonstration programs, and commercial application of energy technology activities.

Office of Science

The Committee believes that the Administration's FY05 request for DOE's Office of Science, which funds 40 percent of the Nation's physical science research, is inadequate. The budget proposes funding the Office at $3.4 billion, a reduction of two percent. This is significantly less than the $4.2 billion included in the House-passed conference report for H.R. 6, *Energy Policy Act of 2003.*

The proposal also falls far short of the goal of the President's Council of Advisors on Science and Technology, which recommended in a 2002 report that the FY04 budget request should begin bringing funding for the physical sciences into parity with that of the life sciences. DOE's Office of Science is the largest federal supporter of the civilian physical sciences, a critical component of the federal research portfolio that has been dwarfed by support for biomedical research in recent years.

The Committee is particularly concerned about the future of user facilities and academic research funded by the Office of Science. In recent years, funding limitations have forced many user facilities to restrict the number of hours they are available to researchers, causing investments that have cost taxpayers billions to sit idle. This year's budget not only continues the problem, but may make it worse in future years. Included in the budget are preliminary design and long-lead acquisition for three new projects (the International Thermonuclear Experimental Reactor, a protein factory, and the Linac Coherent Light Source). The Committee is concerned that if work begins on these projects in such a constrained budgetary environment, either the construction of the facilities will be prolonged, raising their costs, or core research programs may have to be cut.

Over the last few years, the Committee has repeatedly expressed concern about the deterioration of many DOE facilities. To address this deterioration, the FY05 budget proposes to reduce allocations for infrastructure and to allow third parties to build new facilities that the Federal Government will then lease. While this approach may be feasible in some instances, it is important that adequate safeguards be in place to ensure that private interests serve public needs rather than the other way around. Further, the Committee is concerned that this approach does not adequately address the ongoing infrastructure needs of DOE facilities.

Energy Supply R&D

The Committee is concerned that R&D related to energy efficiency and alternative sources of energy is underfunded, especially at a time of higher fuel prices. Energy efficiency and renewable research has been reduced by 1.3 percent since FY01.

The Committee supports the President's initiative calling for America to lead the world in developing hydrogen-powered automobiles and the necessary fueling infrastructure to support them, although many details have not yet been determined. The Committee is pleased that the Administration has requested $228 million for hydrogen technology programs, a 28 percent increase over FY04 enacted levels.

The Committee is concerned, however, that the proposed increases in hydrogen programs come at the expense of much of the rest of the R&D funded by DOE's Energy Efficiency and Renewable Energy account. For example, biomass R&D, which is crucial to increasing our energy independence while helping American farmers, receives a significant cut.

The Committee is troubled by the Administration's diminished commitment to nuclear energy research, especially the Advanced Fuel Cycle Initiative (AFCI) and the Nuclear Energy Research Initiative (NERI). The AFCI develops technologies that can reduce the volume and long-term toxicity of high-level waste, which is critical to the responsible stewardship of spent nuclear fuel. NERI, which funds innovative, peer-reviewed nuclear research at universities, has been the source of new ideas for improving the safety and performance of nuclear energy. These technologies may also enhance national security by reducing the danger of proliferation of nuclear materials.

While the Committee continues to support the Clean Coal program with the requirements that were included in H.R. 6, the Committee has concerns about the FutureGen project, which is to be funded with rescinded Clean Coal funds. In particular, the Administration's request for $237 million for the FutureGen project includes language that would exempt the project from the basic good government provisions needed to control costs.

SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY AND STANDARDS

Environmental Protection Agency (EPA)

EPA's Office of Research and Development (ORD) is responsible for 80 percent of EPA's R&D activities, and it receives the majority of funds available in the agency's Science and Technology (S&T) account. ORD serves a unique role in environmental R&D: it conducts basic and applied research that supports EPA's regulatory pro-

grams and investigates the next generation of environmental challenges. To meet these needs, ORD conducts intramural research at EPA's many laboratories and it supports extramural research at colleges and universities through the Science to Achieve Results (STAR) grant program.

For FY05, the budget request includes $689 million for S&T at EPA, an 11.8 percent reduction. Much of this cut stems from a 35 percent reduction in funding for the STAR extramural grant program. This reduction—which would decrease available funding for ecological research by $22.2 million, pollution prevention research by $5 million, endocrine disruptor research by $4.7 million, and mercury research by $2 million—results from the STAR program's poor score in the Office of Management and Budget's Program Assessment Rating Tool (PART Review). The poor score is surprising in that it comes just a year after the program was endorsed by the National Research Council in its report, *The Measure of STAR*. The Committee plans to hold hearings shortly to review OMB's assessment of the STAR program, and will seek restoration of the STAR funds if the criticisms of the program seem unjustified.

The Committee is also troubled by the proposed elimination of ORD's building decontamination research program. EPA has been working closely with DHS and the Centers for Disease Control and Prevention to aid in the detection and removal of biological and chemical contaminants in the environment. EPA has brought expertise to the table that other agencies do not have. The budget neither explains why this program is eliminated nor indicates whether the $8.3 million currently spent on building decontamination research will be transferred to another agency to carry out this important work.

The Committee is pleased the budget includes funding for the STAR Fellowship program, which supports graduate student fellowships in environmental science. However, the Committee believes the program should be funded at $10 million, the level enacted in FY03 and FY04.

The Committee also supports the budget request for increased funding to improve computational toxicology, which helps reveal the sequence of events by which chemicals can cause adverse effects in humans, and the Integrated Risk Information System, which provides critical human health information that enables health-based decision-making.

Department of Commerce—National Oceanic and Atmospheric Administration (NOAA)

NOAA's activities include providing weather forecasts and warnings, charting the seas for navigation, developing guides for the use and protection of ocean and coastal resources, and performing research to improve understanding of marine, coastal and atmospheric environments. The Committee has jurisdiction over four of NOAA's five line offices—the National Ocean Service, the Office of Atmospheric and Oceanic Research, the National Environmental Satellite Data and Information Service, and the National Weather Service.

The FY05 budget request for NOAA is $3.4 billion, a decrease of $308 million (8.3 percent). Most of the reduction is due to the elimination of earmarks, and the Committee supports this overall level of funding for NOAA.

The Committee is pleased with the requested increase of $13.5 million for climate change research and observations. Most of the increase is to support the Climate Change Research Initiative, which focuses on priority areas such as ocean observations, aerosol research and carbon cycle research.

The Committee also supports the request of $898 million for satellite programs at NOAA. This request is a $71 million (8.6 percent) increase over the FY04 enacted level of $827 million. The increase is for procurement, acquisition, and construction of the next generation of weather satellites, and it is in line with the long-term budget plans for these satellite systems. The Committee remains concerned, however, that the most recent polar satellite budget plan, if enacted, could result in a gap in polar satellite coverage at the end of this decade. The plan proposes that the last of the old generation satellites be launched without having a new satellite available as a backup in the event of a launch failure. If such a loss were to occur, no replacement satellite would be available until the next scheduled launch date—a gap in coverage of up to 21 months. Polar weather satellites provide data for three- to seven-day weather forecasts, hurricane and storm tracking, and climate science observations. The Committee held a hearing about this problem last year and it is working with the General Accounting Office (GAO) to examine the costs and risks associated with NOAA's polar satellite program. To date, the cost of the entire program has risen from original estimates of $6.5 billion to the most recent estimate of $7.4 billion.

The Committee strongly supports NOAA's request for $27 million for satellite data product processing and distribution, and $26 million for satellite product development, readiness and application. The Committee is concerned about NOAA's current and future capability to utilize, manage, and store satellite and weather data critical for forecasting and research. These funding levels will ensure that our large investment in satellites is fully utilized with timely and useful satellite data products.

The Committee is pleased the Administration has requested an increase of $2.2 million over the FY04 enacted level of $5.3 million for the Space Environment Center. The Center, which predicts the effects of solar storms, is vital to our ability to mitigate damage to our telecommunications, aviation, and electricity industries during such storms.

Department of Commerce—Technology Administration

The bulk of the Technology Administration's funding goes to the National Institute of Standards and Technology (NIST), the Nation's oldest federal laboratory, which has consistently provided high-quality research in a wide variety of fields, including homeland security, nanotechnology, health care, building science, and computer security. The budget request includes $422 million for the core NIST laboratory functions (the Scientific and Technical Research and Services account, or STRS) in FY05—an increase of about $84 million (according to updated NIST figures), or almost 25 percent. The Committee strongly supports this request, which is especially needed to restore steep funding cuts NIST's base programs sustained in FY04. The full increase is necessary to restore the cuts.

The proposed request must cover the cost-of-living increase for federal employees, the one-time costs associated with purchasing equipment for the new Advanced Measurement Laboratory (AML), the loss of internal NIST funding from the proposed elimination of the Advanced Technology Program (ATP), and the costs of laying off employees who worked on ATP. The entire remainder of the proposed increase would be needed to restore the cuts made in FY04.

The request includes funding for a number of initiatives important to many sectors of our nation's economy and security, including nanomanufacturing, cyber security, and standards development and testing for equipment for first responders and the military. The request could also enable NIST to undertake its responsibilities under the *Help America Vote Act* (HAVA) to help develop technical standards for voting equipment, although no funds have been explicitly requested for that purpose. NIST needs at least $2.8 million in both FY04 and FY05 to begin to carry out its vital responsibilities under HAVA. The Committee views the funding of NIST's activities under HAVA as a top priority.

The Committee supports the budget request of $33.7 million for NIST's construction account, which includes funding to complete the upgrades at the Central Utility Plant at NIST's laboratory in Boulder, Colorado. The Committee also is pleased that construction of the AML in Gaithersburg, Maryland, will be completed on schedule. The Committee supports the $25 million requested for FY05 in the Research Support Account (part of the STRS account) for new scientific instruments that would make the AML fully operational. Funding for this equipment is critical to the nanomanufacturing initiative proposed for FY05, and it will ensure that full advantage can be taken on AML's world-class facilities.

The Committee is concerned that the $39 million request for the Manufacturing Extension Partnership (MEP) fails to restore the devastating 65 percent cut in FY04. MEP provides smaller manufacturers with technical assistance to become more competitive, and it has a proven track record; numerous studies bear out its contributions to the economy. The FY04 level of funding will result in a downsizing process (currently underway) that will close many MEP centers and potentially cripple the program. The proposed budget for FY05 would only reinforce this trend. The Committee believes that it will reduce the effectiveness of MEP at a time when it is most needed.

The Committee continues to support ATP and is disappointed that the Administration has included no funds for ATP in the FY05 request. The Committee supports funding the program at the FY04 enacted level ($169 million).

Department of Commerce—National Technical Information Service (NTIS)

The Committee looks forward to working with the Administration to keep NTIS functioning as a self-sustaining entity.

SUBCOMMITTEE ON RESEARCH

National Science Foundation (NSF)

The National Science Foundation (NSF) is the primary source of federal funding for non-medical basic research conducted at colleges and universities. NSF funds basic research across nearly all disciplines of science and engineering, making NSF-supported research integral to progress in national priority areas such as health care and national security, among others. In addition, NSF sponsors programs to improve K–12 and undergraduate education, and its fellowships and research assistantships support many graduate and post-doctoral students.

NSF continues to receive high marks from the Office of Management and Budget for the quality of its management and for the excellence of its programs. As in the FY04 budget request, NSF was awarded two green lights on the Executive Branch Management Scorecard. Also, in the past year, four NSF programs were examined using the Program Assessment Rating Tool (PART): Nanoscale Science and Engineering, Information Technology Research, Facilities, and Individuals (programs directed toward math, science, and engineering education and training of students at the K–12, undergraduate, and graduate levels). All received ratings of Effective (the highest rating).

The FY05 budget request for NSF is $5.75 billion, an increase of three percent, or $167 million over the FY04 level. This insufficient request is $1.6 billion below the funding level in the *National Science Foundation Authorization Act of 2002* (P.L. 107–368). The budget requests the largest percentage increases for personnel and administrative initiatives and for construction of major research facilities.

The Research and Related Activities (RRA) account, which contains the funds for most NSF research grants programs, receives a 4.7 percent increase. However, actual spending on research programs would increase by only 2.8 percent because the Administration transfers into the research account funds that would be used to close out the Math and Science Partnerships program (an education and human resources program).

While recognizing that budget realities may not allow Congress to fund NSF at the guidance level provided in the current authorization, the Committee still believes that significant increases for NSF's overall budget are warranted. Congress should provide as much funding as possible to strengthen support for core science and education programs, and priority areas such as information technology and nanoscale science and engineering research.

Education and Human Resources

The Committee strongly opposes the proposed cuts for programs in NSF's Education and Human Resources (EHR) account. The Committee is especially troubled by the proposal to eliminate the NSF's Math and Science Partnership Program. This program was specifically authorized as part of the *National Science Foundation Authorization Act of 2002.* The Committee strongly believes that NSF is the only federal agency with a proven record of selecting education projects that offer the best hope to narrow the achievement gap and raise student performance in math and science. Through its competitive, merit-based process, NSF is uniquely qualified to use its decades of experience in education research and evaluation to appraise grant proposals and to strengthen the link between research findings and classroom practice. The Partnerships program should be funded at the authorized level of $200 million.

The Committee also opposes proposed cuts in two other programs that were created in the 2002 Act. The Noyce Scholarship Program and the Tech Talent Program (referred to as the Science, Technology, Engineering and Mathematics Talent Expansion Program, or STEP) should be funded at their authorized levels of $20 million and $30 million, respectively.

United States Fire Administration (USFA)

The U.S. Fire Administration (USFA) was created in 1974 to aid localities in reducing the loss of life and property from fires and related emergencies. As an entity of the Federal Emergency Management Agency (FEMA), USFA was officially transferred into the Department of Homeland Security in March of 2003. Last November, the President signed Science Committee legislation reauthorizing USFA activities through FY 2008, including $63 million for FY05 (P.L. 108–169). The budget request does not specify a level of funding for USFA. USFA should remain a distinct entity within DHS.

From FY01 through FY03, USFA also administered the (separately authorized) Assistance to Firefighters Grant Program. This popular program provides direct assistance to local fire departments for training, purchase of equipment, and other purposes. In the FY04 appropriations act for DHS, the program was transferred to

the DHS Office of Domestic Preparedness (ODP). The FY05 budget request includes $500 million for the fire grant program at ODP. As the fire grant program authorization is due to expire this year, the Committee plans a comprehensive review of the program in preparation for reauthorization later this year. This review will include thorough consideration of which agency is most appropriate to administer the program, as well as an examination of the effectiveness of the program at improving first responder preparedness.

National Earthquake Hazards Reduction Program (NEHRP)

NEHRP is an interagency program that Congress created in 1977. It includes NSF, NIST, FEMA, and the U.S. Geological Survey (USGS). The program aims to reduce the loss of life and property from earthquakes by improving emergency response, increasing our understanding of earthquake risks, and improving earthquake engineering.

The President's overall FY05 request for NEHRP is $114.5 million, including $57.7, $46.5, $20.5, and $1.8 million, for NSF, USGS, FEMA, and NIST, respectively. With the exception of NSF NEHRP activities, which receive a 20 percent increase for earthquake engineering simulation research, these amounts are roughly flat compared to FY04 levels. The Committee remains concerned that NEHRP continues to operate without true interagency coordination, and has reported legislation, H.R. 2608, that seeks to address this problem. H.R. 2608 passed the House late last year and is awaiting action in the Senate. The Committee also notes its concern for the low funding request for the Advanced National Seismic System (ANSS), which has been continually funded at less than 10 percent of authorized levels.

SUBCOMMITTEE ON SPACE AND AERONAUTICS

National Aeronautics and Space Administration (NASA)

The budget request provides $16.244 billion for NASA in FY05, an increase of 5.6 percent, by far the largest percentage increase for any civilian science agency. The budget is shaped by the President's proposed space exploration initiative and constitutes, in many respects, a first down payment on the President's proposal to send humans back to the Moon and eventually on to Mars "and beyond."

The Committee has just begun holding hearings on the President's initiative and does not yet have a position on it. Moreover, the Committee's evaluation of the proposed initiative has already highlighted many unanswered questions about its costs. As a result, the Committee cannot yet evaluate whether NASA's overall FY05 budget request is appropriate, or too high or too low. Instead, in this document, the Committee will note some of the areas of concern in the FY05 budget proposal, and in the budget that has been laid out for the four ensuing fiscal years. These comments are also informed by a NASA chart that projects spending out to 2020, by which time humans will have returned to the Moon if the initiative unfolds as planned.

Under the President's plan, the Space Shuttle and International Space Station programs remain the centerpieces of NASA's human space flight program for the near-term. Nearly half of NASA's FY05 budget is dedicated to these two programs.

It is unclear whether the FY05 budget for the Space Shuttle is adequate to return to flight. Recently, NASA announced that the Shuttle would not resume flying before March 2005—a year later than NASA's original projections and about five months later than the most recent estimate. The Committee is pleased that NASA is not rushing the return to flight. But the delays highlight the inherent uncertainty about what tasks will need to be completed to return to flight and what expenses those tasks will entail.

The understandable delays in returning to flight necessarily raise concerns about whether NASA's schedule for completing construction of the Space Station are overly optimistic. The President's initiative assumes that Station construction will be completed around 2010, freeing up funds for other endeavors and avoiding an extremely costly recertification of the Shuttle. (The *Columbia* Accident Investigation Board said the Shuttle should not be flown after 2010 unless it were recertified.)

The Committee is also unable to evaluate the proposed $1.1 billion FY05 budget for Biological and Physical Research, most of which would be spent on the Space Station. Under the President's initiative, NASA is to re-orient the Station research program to focus on the biological research needed to overcome the impediments that space presents to astronauts' long-term survival. NASA has just begun to develop that new research program, so it is impossible to know what it should cost.

The Committee also needs additional information to evaluate the $428 million FY05 budget request for the Crew Exploration Vehicle (CEV), the new vehicle NASA intends to design to transport humans on missions to the Space Station, the Moon and beyond. The FY05 funding is the first installment on a development

project that NASA estimates will cost $6.6 billion between FY05 and FY09 and another $8.4 billion by the time the CEV is ready to achieve its first flight with humans on-board in 2014.

NASA's proposed FY05 budget for Space Science is $4.1 billion, an increase of approximately five percent over FY04 levels. As part of the President's initiative, the FY05 budget for Space Science includes a new robotic program for lunar exploration. The FY05 budget also reflects the transfer of a major portion of Project Prometheus out of Space Science and into the new Exploration Systems account.

While the budget for Space Science appears to be adequate, the Committee is still reviewing the projects that will be deferred or eliminated to carry out the President's proposal. Of particular interest is the Joint Dark Energy Mission, which was to have been funded by NASA and DOE. The Committee is also concerned with NASA's decision to cancel future Hubble servicing missions. Any decision to reinstate Hubble servicing missions would likely require additional funding in the FY05 budget.

NASA's proposed FY05 budget for Earth Science is $1.4 billion, a decrease of nearly three percent from FY04 levels. The Committee believes that the budget request for these programs is inadequate to meet the pressing needs for better satellite data. The cuts, which are designed to help fund the exploration initiative, seem ill-timed when the Administration has announced a significant new global change research plan.

The Committee is also troubled by the limited funding the budget provides for NASA's Aeronautics program. The budget cuts the program by nearly three percent, down to less than $919 million for FY05. Aeronautics research has long been level funded, and it is especially disadvantaged as NASA's overhead costs of operating infrastructure fall disproportionately on this program.

Federal Aviation Administration (FAA)

The Committee continues to be disappointed with the tepid support for Federal Aviation Administration research and development activities. The budget request of $237.4 million represents a slight decrease from FY04 enacted levels, and is significantly less than the $356.2 million authorized by the *Vision 100—Century of Aviation Reauthorization Act* (P.L. 108–176), signed by the President on December 12, 2003.

The FAA, together with other federal departments and agencies, is embarking on an extensive, long-term project to develop a next generation air traffic management system. The Committee believes this activity, coupled with on-going research, demands greater investment.

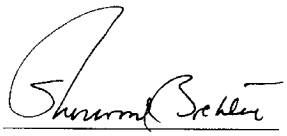
The FY05 request for the FAA's Office of the Associate Administrator for Commercial Space Transportation (AST) is $11.9 million. The Committee is optimistic that eventual passage of legislation (H.R. 3752) authorizing AST to develop regulations for commercial human space flight will result in the development of a robust and profitable new industry. The Committee, however, remains concerned that AST is continuing to develop burdensome and costly launch regulations that will undermine the competitiveness of the existing U.S. expendable launch industry.

Department of Commerce—Office of Space Commercialization

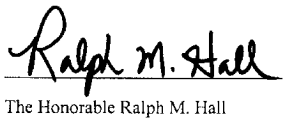
The Committee urges continued support for this Office. The Office has played a useful role in promoting the commercial space industry and in removing unnecessary impediments to its development. The Office needs to take a stronger role in legal and policy discussions within the government and be more aggressive in assisting U.S. commercial space providers in their efforts to conduct business with the government.

Committee on Science – FY 2004 Views and Estimates

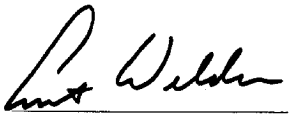
Member Signatures



The Honorable Sherwood L. Boehlert, *Chairman*

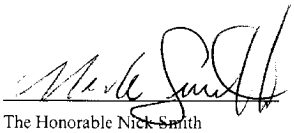


The Honorable Ralph M. Hall



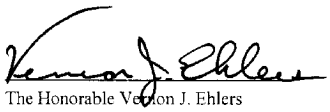
The Honorable Curt Weldon

The Honorable Ken Calvert

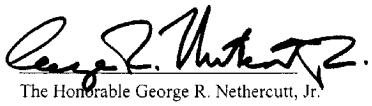


The Honorable Nick Smith

The Honorable Roscoe G. Bartlett

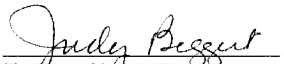


The Honorable Vernon J. Ehlers

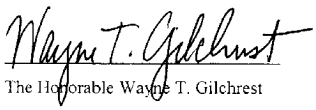


The Honorable George R. Nethercutt, Jr.

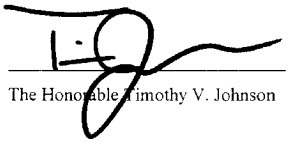
The Honorable Frank D. Lucas



The Honorable Judy Biggert



The Honorable Wayne T. Gilchrest

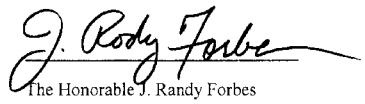


The Honorable Timothy V. Johnson

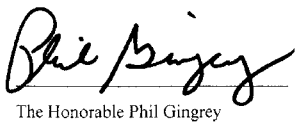
Committee on Science – FY 2004 Views and Estimates

Member Signatures

The Honorable Melissa A. Hart



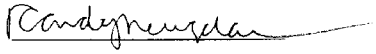
The Honorable J. Randy Forbes



The Honorable Phil Gingrey

The Honorable Michael C. Burgess

The Honorable Jo Bonner



The Honorable Randy Neugebauer

Committee on Science – FY 2004 Views and Estimates

Member Signatures

The Honorable Bart Gordon, *Ranking Member*

The Honorable Mark Udall

The Honorable Michael Honda

The Honorable Zoe Lofgren

The Honorable Sheila Jackson-Lee

The Honorable Dennis Moore

The Honorable Lincoln Davis

SCIENCE COMMITTEE MINORITY ADDITIONAL VIEWS
FY 2005 VIEWS AND ESTIMATES
TO THE HOUSE BUDGET COMMITTEE
MARCH 8, 2004

Introduction

The government plays a unique role in meeting the Nation's investment needs. Since the time of Adam Smith, it has been recognized that some public needs will go unmet unless the government steps in. Bridges, roads, seaports, airports, education, and research and development (R&D) are all areas where private investment would fall short of the true public need.

Today's globally competitive environment requires the Federal Government to meet these needs as rapidly as possible. Each failure to invest in infrastructure, in education, or in innovation can contribute to the costs of doing business in America and create a rationale for businesses to close their doors, for jobs to be moved offshore, and for opportunities to simply slip away. Innovation is about responding to real public needs today to guarantee that our citizens have jobs and a better quality of life tomorrow.

At a tune when we have suffered three years of recession and jobless recovery, and at a tune when more businesses are moving work to foreign operations, a stagnant level of investment, as we find in the President's FY 2005 budget submission, is simply unacceptable.

We have to do better. We would concede that such a task is almost beyond our measure due to the horrific federal deficit that we face. This year's budget request alone will probably add at least $600 billion to the national debt when costs of the occupation of Iraq are finally accounted for. Given that burden, it is hard to argue for increasing funding for investments, but it is just such investments in our economy and our people that can help get us out of the hole dug by this Administration's fiscal choices. So not only do we have to do better than the Administration's proposal, we cannot wait for a future Administration; having wrestled this irresponsible deficit to the ground, to take action. Investments have to happen in this next fiscal year.

Three Recommendations for the FY 2005 R&D Budget

Recommendation #1: Increase civilian R&D spending in function 250 and function 270 by at least five percent in the FY 2005 budget.

On December 19, 2002, President Bush signed into law H.R. 4664, which authorized a doubling of the NSF budget over the period of five years. The original NSF doubling bill was introduced in the House by Rep. Eddie Bernice Johnson several years earlier. Only after intense activity on the part of many interested scientific and industry groups, and by a bipartisan coalition of Members of Congress, was the NSF-doubling bill enacted. That bill, and other efforts to increase funding for the physical sciences, are emblematic of the broad recognition that funding for R&D in the physical sciences has lagged dangerously in recent years.

For this reason, and recognizing the staggering problem we face with the current deficit, we are recommending a modest five percent increase in funding for functions 250 (Science) and 270 (Energy) of the federal budget. Any number for increased R&D investment is somewhat arbitrary. However, we believe that a five percent increase for these functions is a good place to start and hope that an improved budgetary climate will allow these figures to increase dramatically in future budgets. We simply must improve upon the President's budget for NSF, which falls $1.6 billion below the level he endorsed in H.R. 4664.

A five percent increase would also allow us to move towards the President's Council of Advisors on Science and Technology (PCAST) goal of bringing the physical sciences and engineering into parity with the life sciences, It was just two years ago that PCAST reported to the President that, "All evidence points to a need to improve funding levels for physical sciences and engineering. Continuation of present patterns will lead to an inability to sustain our nation's technical and scientific leadership. We recommend that beginning with the FY04 budget and carrying through the next four fiscal years, funding for physical sciences and engineering across the relevant agencies be adjusted upward to bring them collectively to parity with the life sciences."

We suspect there are many budgetary choices that could be made to meet our goal of a five percent increase in R&D funding. The Budget Committee has the crosscutting responsibility and authority to tend to these needs right now, and we encourage that Committee to do so.

Recommendation #2: Until the Congress has better information on which to judge the long-term cost of the President's Moon/Mars initiative, we believe that NASA's FY 2005 funding request should be reallocated in a manner that strengthens NASA's existing programs, helps address the backlog of deferred maintenance at NASA's facilities, ensures that the Shuttle will continue to fly safely for as long as it is needed, ensures that the International Space Station will be a safe and productive facility, makes a start on a replacement means of getting U.S. astronauts into space, and enables the analyses that will be needed to develop a viable and sustainable exploration agenda.

A full description of this recommendation may be found later in this report.

Recommendation #3. Programs under the Committee's jurisdiction that enhance the competitiveness of U.S. manufacturing and promote innovation should be fully funded. These programs include the Manufacturing Extension Program (MEP) and the Advanced Technology Partnership (ATP) in the Department of Commerce, as well as cooperative government/industry/university programs funded through other civilian agencies, including NASA, NIST, and the Department of Energy.

A description of the benefits of the MEP and ATP programs may be found later in this document.

Analysis of the President's FY 2005 budget for R&D

The President's science team, headed by Dr. Jack Marburger, contends that tree FY 2005 R&D budget request is very robust, considering the fiscal pressures under which the Federal Government is operating. We could dwell here—but we won't—on the fact that the policies of the President and his team have caused most of these fiscal pressures.

These are some of the points that Dr. Marburger has made in the past few weeks to buttress his argument:

> "Total Federal R&D investment during the [President's] first term will be increased 44 percent. That's the equivalent of increases of 10 percent each year."
>
> "The budget commits 13.5 percent of total discretionary outlays to R&D. Not since 1968 and the Apollo program have we seen an investment in science of this magnitude."
>
> "Funding for basic research is at an all time high of $26.8 billion in FY 2005."
>
> "The non-security R&D growth rate is 2.5 percent."

Some of these statements are careful, selective arrangements of facts designed to put a positive spin on a dismal overall picture. Some of the statements are simply false. *The fact of the matter is that the FY 2005 budget submission for R&D (excluding weapons development) is the most anemic R&D budget submitted to the Congress by any President in the past 20 years.* It is an R&D budget unsuited to the challenges of the time.

Here are some of the problems that we find with the Administration's spin on their R&D submission:

The Request for Science Funding is Flat—The Administration brags about a five percent increase for R&D spending in 2005, but fails to mention that the increase is largely targeted for weapons development and other defense programs. In our view, the most representative measure of R&D funding, and the measure which best captures the economic and broader societal benefits of R&D funding, is the concept of the "Federal S&T budget" (FST), which the National Academy of Sciences developed several years ago. FST includes civilian R&D and defense R&D, but not weapons development. Page 61 of the "Analytical Perspectives" document, from the Administration's own package of FY 2005 budget documents, actually shows a decrease of 0.4 percent in proposed FST funding. This is the first time that any President has requested a decrease in the FST since it has been tracked. Further, government-wide funding for basic research would increase by only 0.6 percent and funding for applied research by only 0.5 percent—both well below the rate of inflation.

The President's Analysis Uses Highly Selective or Inaccurate Numbers— There is barely a number in the Administration's presentation that can't be questioned. For example, as cited above, there is a claim that "the non-security R&D growth rate is 2.5 percent;" in actuality, OMB's own category of "Federal S&T" shows a *cut* of 0.4 percent. Another claim is that "not since the Apollo program have we seen an investment in science of this magnitude." While R&D as a percent of discretionary spending is relatively high in historic terms, the elevated levels are

due to defense development, not science. A more important measure—Federal R&D as a percentage of GDP—is near a 50-year low of 0.7 percent.

Tricky Accounting Is Used to Inflate Minuscule Increases in Agency Budgets—At NSF, the R&D numbers are deceptively inflated by adding close-out costs of unrelated education programs. Included in the Administration's purported $201 million increase for NSF research is $80 million for close-out funding for the Math & Science Partnership Program, which is current awarded under the K–12 education program. The actual increase for new science activities is therefore 2.7 percent rather than the advertised 4.7 percent.

At NIST, the Administration claims a 20 percent increase of $86 million for core laboratory programs. In fact, however, this supposed "increase" includes: $25 million for equipment normally listed in the working capital fund, $13 million to make up for ATP grants that will no longer be transferred to the laboratories, and $35 million to cover ATP close-out costs. Laying aside for a moment the devastation of NIST's MEP and ATP programs, almost no funding is actually left over for a real increase in NIST's in-house research.

The Budget Does Not Deal with the Challenge of Job Creation—The single best government program to provide immediate help to U.S. manufacturers—the Manufacturing Extension Partnership—is severely slashed. The Advanced Technology Program is eliminated. Technology transfer programs at NASA and DOE are cut, and there are no new ideas or initiatives for moving federal technologies into the private sector, especially small businesses.

The President Takes Credit for Congressional Actions from Prior Years—When it appears to strengthen their case, the Administration brags about increases in various R&D accounts over the past four years, without distinguishing in any way between the President's requests and subsequent Congressional action. In fact, the Administration's R&D priorities have remained virtually unchanged since it submitted its first R&D budget in early 2001 (well before the 9–11 terrorist attacks). Those priorities have been: funding weapons development at the Defense Department; signing on to the Congressional goal and completing the doubling of the NIH budget in FY 2002–03; and increasing homeland security R&D in 2004–2005. All other Federal R&D programs have fared very badly in the President's four budget submissions, but have been rescued year after year by Congressional action. By citing four-year trends, rather than the weak FY 2005 budget submission numbers, the Administration tries to leave the impression that it alone is responsible for R&D increases.

The Administration Treats Congressional Earmarks Hypocritically—The Administration decries R&D earmarks but does nothing (e.g., requiring competition) to lessen their impact. Furthermore, when it suits the Administration to count earmarks (e.g., when crowing about budget increases from 2001–2005), they do so. When it doesn't suit them to count earmarks (e.g., when claiming that one of their FY 2005 budget cuts isn't so bad when the FY 2004 earmarks are discounted), they don't.

The Administration Hasn't Followed Through On Their Commitments—Two years ago, the President signed an authorization bill doubling NSF funding over five years. The requests for NSF since the signing ceremony have been anemic—they might produce a doubling in about 25 years. In another example, Secretary of Energy Abraham late last year gave a well-received speech at the National Press Club touting DOE's long-term plan for construction of new scientific facilities. However, in the FY05 budget, funding for DOE facilities is cut severely. Also, DOD officials have supported the idea of targeting a significant increase—up to three percent of the DOD budget—for R&D, but defense R&D in this budget is cut severely. Finally, the President signed a bill last year authorizing greatly expanded funding at NSF and NIST for cyber security R&D and training—a critical element in any strategy to deal with terrorist threats. The FY 2005 budget contains no new funding for this initiative.

The President's Human Space Flight Initiative

While we welcome the President's announcement of long-term goals for the Nation's civil space program, we are concerned that the budget request for the National Aeronautics and Space Administration (NASA) raises more questions about the President's initiative than it answers. Without more information on the costs and impacts of the President's proposal, it would be irresponsible at this time for us to endorse the initiative and the liens it would impose on the NASA budget over the next several decades.

The President's initiative is described as "affordable." However, at the Committee's recent hearing on the initiative, the NASA Administrator and the Director of the President's Office of Science and Technology Policy (OSTP) were unable to provide a clear answer when asked what the President was told about the casts of the initiative, and in particular the cost of returning humans to the Moon. Equally troubling, when asked if the Committee could assume that *"what you are allocating and what you think is necessary to complete the mission is the same thing,"* the NASA Administrator replied: *"No, sir. What is occurring in 2009 and out is a projection of what the transition, the transformation of the approach that we are taking here would import if you compare if to the annual cost of an inflation-level increase to the annual top line. That is all that this attempts to do.. . . ."* When asked the clarifying question: *"Does that projection try—is that projecting what it is going to cost to get us to the Moon?,"* the NASA Administrator responded: *"No sir, it does not."* We thus must conclude that the case for the affordability of the initiative has yet to be made. That concerns us as we contemplate committing the American taxpayer to an initiative whose major costs will be incurred after this Administration has left office. NASA's recent failure to pass its external financial audit for the second time in the last three years only compounds our concern.

We are also troubled by the impact of the President's initiative on other important NASA programs and activities. In order to pay for the proposed exploration agenda, NASA's aeronautics and Earth science programs—which have suffered over the last three years—would continue to languish for the next decade and a half. Research and development on next generation space transportation systems that could significantly reduce the cost and increase the reliability of access to space would be essentially curtailed. Exciting new avenues of research into fundamental mysteries of the universe would be deferred. Another three quarters of a billion dollars would be removed from the budget for research on the Space Station—research that until recently was touted by NASA as benefiting citizens here on Earth.

Moreover, in order to make the budgetary math work, the President's initiative requires NASA to abandon the Space Shuttle *years before a replacement vehicle will be available.* In short, the Administration has decided to make the United States dependent on Russia for getting our astronauts into space anti! the proposed Crew Exploration Vehicle becomes operational—if all goes well—a decade from now. At the same time, the Administration has steadfastly refused to explain how it intends to deal with the prohibitions contained in the Iran Nonproliferation Act against acquiring such crew transfer services from Russia.

We thus believe that the burden of proof is on the Administration to demonstrate both the affordability of the President's request and the wisdom of the policy decisions that have been made to fund it. Unless and until that happens, we believe that NASA's funding request should be reallocated in a manner that strengthens NASA's existing programs, helps address the backlog of deferred maintenance at NASA's facilities, ensures that the Shuttle will continue to fly safely for as long as it is needed, ensures that the International Space Station will be a safe and productive facility, makes a start on a replacement means of getting U.S. astronauts into space, and enables the analyses that will be needed to develop a viable and sustainable exploration agenda. That reallocation should start when Congress considers NASA's proposed FY 2004 Operating Plan and should continue in Congress's consideration of the FY 2005 budget request.

We agree with the President that we need a vision for the Nation's civil space program. However, challenging goals have to be tied to a viable and prudent implementation plan if they are to be more than rhetoric. We hope that the Administration will step up to the task of developing such a plan.

The Importance of the Advanced Technology Program and Manufacturing Extension Program at the Department of Commerce

The Advanced Technology Program (ATP) at the National Institute of Standards (NIST) is a modest program aimed at bridging the gap between the research lab and the marketplace. All too often we have heard that while the U.S. is at the forefront of basic research, U.S. companies often do not capitalize on these basic research results. The ATP is designed to address this market-place failure. Partnering with the private sector, ATP early-stage investment accelerates the development of innovative technologies that promise significant commercial pay-offs and widespread benefits for the Nation. With a modest federal investment (approximately $180 million/year), the ATP fosters the development of technologies that create the industries and the jobs of the future. The Administration's own analysis for ATP shows that benefits from just a few ATP projects reviewed to date is projected to exceed $17 billion.

The ATP partners with companies of all sizes and non-profits, encouraging them to take on greater technical challenges with potentially that extend well beyond the innovators. For small start-up firms, early support from the ATP can spell the difference between success and failure. Universities and non-profit independent research organizations also play a significant role as participants in ATP projects with well over half the projects including university participation—more than 160 universities and over 25 national labs participate in ATP projects.

The ATP has several critical features that set it apart from other government R&D programs. It focuses on the technology needs of American industry, not those of government, has strict cost-sharing rules, and does not fund product development. Awards are made strictly on the basis of rigorous peer-reviewed competitions, and support does not become a perpetual subsidy or entitlement.

The Administration's proposed elimination of ATP is extremely short sighted as the U.S. continues to shed manufacturing jobs and high-tech service jobs. Rather than eliminating investments in our future, we must invest in proven programs that will develop the technologies will provide jobs in the future.

The attitude that workers and manufacturers can fend for themselves also marks the Administration's position on funding for MEP. The Bush Administration continues to ignore the economic plight of our small manufacturers by gutting the Manufacturing Extension Partnership (MEP) program. The FY05 budget request is two-thirds less than what is required to maintain the existing MEP network of centers and services.

Approximately 350,000 small manufacturers account for over half the total value of U.S. production and represent 98.8 percent of all manufacturing establishments. They employ nearly 11.1 million people and account for two-thirds of all U.S. manufacturing employment. These jobs are high-skilled and high-wage, with production employees earning 50 percent more than retail employees per hour.

MEP is a national network of manufacturing extension Centers and field offices located throughout all 50 states and Puerto Rico. Centers are funded by federal, State, local, and private resources to serve small manufacturers. Each Center works directly with local manufacturers to provide expertise and services tailored to their most critical needs, which range from process improvements and worker training to business practices and information technology applications. Last year, the MEP served 18,422 small manufacturers across the country. In 2002, MEP assistance resulted in $2.79 billion in increased/retained sales, $681 million in cost savings, $940 million investment in modernization, and 32,000 jobs created or retained. At a time of continued bleeding of U.S. manufacturing jobs, it is hard to imagine a more ill-advised budget cut than the Administration's gutting of the program.

Hon. Bart Gordon
Hon. Eddie Bernice Johnson
Hon. Nick Lampson
Hon. Mark Udall
Hon. Michael Honda
Hon. Lincoln Davis
Hon. Zoe Lofgren
Hon. Dennis Moore
Hon. Jim Matheson
Hon. Jerry Costello
Hon. Lynn Woolsey
Hon. John Larson
Hon. David Wu
Hon. Brad Miller
Hon. Sheila Jackson Lee
Hon. Brad Sherman
Hon. Anthony Weiner
Hon. Dennis Cardoza

ADDITIONAL VIEWS OF REPRESENTATIVES GORDON AND COSTELLO

We strongly support the Administration's budget request for the FutureGen clean coal research initiative, This project will lead to technologies that would allow the United States to utilize coal, our most plentiful fossil fuel resource, in an environmentally responsible fashion. The goal of the project is to develop a utility-scale plant that produces hydrogen, sequesters carbon and results in near zero emission of greenhouse gas. This project is an important step in our Climate Change effort, but it will also produce a technology that enhances our nation's energy independence. This is a long-term investment for the country deserving of continued Congressional support.

U.S. House of Representatives
COMMITTEE ON THE BUDGET
Washington, DC 20515

May 20, 2003

The Honorable Sherwood Boehlert
Chairman
Committee on Science
2320 Rayburn House Office Building
Washington, D.C. 20515

Dear Chairman Boehlert:

Controlling Government spending is still the key to fiscal responsibility and a balanced budget. This requires a unified effort by congressional committees, with the support of the congressional Leadership. The most visible opportunities for addressing Government spending lie in the waste, fraud, and abuse that continue to pervade Government programs.

The Conference Report accompanying the budget resolution for fiscal year 2004 (Report 108-71) requires House and Senate authorizing committees to identify means of eliminating waste, fraud, and abuse in mandatory spending programs (programs not subject to annual appropriations) in their jurisdictions. The committees are to submit, to their respective Budget Committees, findings as to the changes in law needed to eliminate specified amounts of waste, fraud, and abuse. This letter describes the procedures we would like you to follow in this effort.

- **Target Levels:** In accordance with the fiscal year 2004 budget resolution, the Budget Committee Chairman is required to specify for each committee an amount of savings that it should strive to identify by eliminating of waste, fraud, and abuse. This amount, and the target for every other authorizing committee, is based on 1 percent of the total level of mandatory spending under each committee's jurisdiction for fiscal year 2004. These amounts in no way imply that waste, fraud, and abuse are evenly distributed across all Federal programs. It is expected that the authorizing committee will draw the savings from only those programs and areas in which waste, fraud, and abuse are most egregious and amendable to changes in public policy.

  As assumed in the current budget resolution, total mandatory outlays under your committee's jurisdiction is .513 billion over 10 years. Based on that figure, your 1-percent amount would translate to -.001 billion in fiscal year 2004, -.003 billion over 2004-08, and -.003 billion over 2004-13.

- **Process for Developing and Reporting Findings:**

  - *Hearings* - Each committee should conduct one or more hearings as part of this effort. Should a committee fail to meet this requirement, the Budget Committee will have the discretion to hold one or more hearings in its place.

  - *Form of Findings* - Findings for each instance of waste, fraud, or abuse should include: 1) identification of the problem; 2) the approximate amount of cost to the Federal budget due to the problem; and 3) the changes in law needed to correct the problem.

  - *Communications* - As always, public awareness and understanding of this effort will be critically important. The Budget Committee communications staff will help coordinate a variety of activities – including television and radio appearances, articles in magazines and other publications, coalition outreach, town hall meetings, electronic media such as web sites, and so on – to supplement your own public information efforts. You are welcome to contact the Budget Committee staff for more information concerning this part of the process.

  - *Process for Reporting Findings* - Committees should be required to report their findings in a manner similar to that of their Views and Estimates on the Federal budget. That is, the findings should be marked up in the same fashion as Views and Estimates. Committee minorities also would be allowed to include dissenting views on the findings of waste, fraud, and abuse. The report is to be submitted no later than 2 September 2003, as called for in the budget conference report. Therefore, committee should plan to mark up before the summer recess, which is scheduled to begin on 28 July.

We all know there is waste, fraud, and abuse in Government programs – and the public knows it too. If we truly believe in controlling Government spending, surely our first step ought to be going after the kind of wasteful spending that should never happen in the first place.

The Budget Committee stands ready to assist you as you carry out this important project. The attached document lists each of the Budget Committee's analysts. If we can be of any assistance, please contact the Budget Committee at 6-7270.

Also attached is a timetable for reporting the findings.

Sincerely,

Jim Nussle
Budget Committee Chairman

Enclosures: 2

Tentative Timeline and Key Dates

May 13	Announce Plan to Committee Chairmen at Chairmen Meeting
May 19-23	Announce Plan to Entire Conference at Conference Meeting
	File Target Levels in Congressional Record
	Conduct Public Information Event (invite all Chairmen to participate)
May 26-July 25	Committees Conduct Hearings and Begin Developing Reports
	Members and Staff Implement Corresponding Communication Activities
	Committees Complete Hearings and Take Formal Action on Report
August	Committees Complete Reports
September 2	Reports are Formally Submitted to the Budget Committee
September 3	Leadership, Budget Committee Chairman, and Other Committee Chairmen Hold Press Conference on Findings
	Findings Are Submitted to Office of Management and Budget
	Findings Are Displayed on the Budget Committee Website
September-End of Year	Findings Are Openly Discussed in Hearings and Other Public Events

BUDGET COMMITTEE ANALYSTS

All analysts can be reached by calling 6-7270

Mike Lofgren ..... National Defense

Bret Coulson ..... International Affairs, Transportation

Roger Mahan ..... Housing and Welfare

Chuck Berwick ..... Agriculture and Environment

Ed Puccerella ..... Science, General Government

Peter Warren ..... Education and Labor

Jason McKitrick ..... Medicare

Jim Cantwell ..... Medicaid and Other Health Programs

Otto Mucklo ..... Justice

Note: If you cannot identify an analyst corresponding to your needs, please contact Patrick L. Knudsen, Policy Director.

Date	Committee on Science List of Hearings with Publication Numbers plus List of Legislative Reports filed in the 108th Congress	Publication Number
Feb. 12, 2003	Space Shuttle Columbia (Joint Hearing held by the Subcommittee on Space and Aeronautics, Committee on Science and the Senate Committee on Commerce, Science, and Transportation.)	108–2
Feb. 13, 2003	Overview of the Federal R&D Budget for Fiscal Year 2004 (Hearing held by the Committee on Science.)	108–1
Feb. 27, 2003	NASA's Fiscal Year 2004 Budget Request (Hearing held by the Committee on Science.)	108–3
Mar. 5, 2003	The Path to a Hydrogen Economy (Hearing held by the Committee on Science.)	108–4
Mar. 6, 2003	A Review of Aeronautics R&D at FAA and NASA (Hearing held by the Subcommittee on Space and Aeronautics.)	108–5
Mar. 12, 2003	The Aerospace Commission Report and NASA Workforce (Hearing held by the Committee on Science.)	108–7
Mar. 13, 2003	Subcommittee Markup: H.R. 1081, Aquatic Invasive Species Research Act (Markup held by the Subcommittee on Environment, Technology, and Standards.)	H.R. 1081/108–69
Mar. 13, 2003	Harmful Algal Blooms and Hypoxia: Strengthening the Science (Hearing held by the Subcommittee on Environment, Technology, and Standards.)	108–8
Mar. 19, 2003	H.R. 766, Nanotechnology Research and Development Act of 2003 (Hearing held by the Committee on Science.)	108–6

Date	Committee on Science List of Hearings with Publication Numbers plus List of Legislative Reports filed in the 108th Congress	Publication Number
Mar. 26, 2003	Markup: H.R. 1297, Columbia Orbiter Memorial Act (Markup held by the Committee on Science)	H.R. 1297/108–69
Mar. 26, 2003	Dealing With Foreign Students and Scholars in an Age of Terrorism: Visa Backlogs and Tracking Systems (Hearing held by the Committee on Science.)	108–9
Apr. 2, 2003	Markup: H.R. 238, Energy Research, Development, Demonstration, and Commercial Application Act of 2003 (Markup held by the Committee on Science.)	H.R. 238/H.Rept. 108–128, Pt. 1
Apr. 9, 2003	The Societal Implications of Nanotechnology (Hearing held by the Committee on Science.)	108–13
Apr. 10, 2003	Transportation Research and Development: Investing in the Future (Hearing held by the Subcommittee on Environment, Technology, and Standards.)	108–10
May 1, 2003	Markup: H.R. 766, Nanotechnology Research and Development Act of 2003 and H.R. 1578, Global Change Research and Data Management Act of 2003 (Markup held by the Committee on Science.)	H.R. 766/108–69 H.R. 1578/108–69
May 8, 2003	NASA's Integrated Space Transportation Plan and Orbital Space Plane Program (Hearing held by the Subcommittee on Space and Aeronautics.)	108–18
May 8, 2003	The National Earthquake Hazards Reduction Program: Past, Present, and Future (Hearing held by the Subcommittee on Research.)	108–14
May 14, 2003	Cyber Security Research and Development (Hearing held by the Committee on Science.)	108–17
Jun. 4, 2003	Markup: H.R. 1081, Aquatic Invasive Species Research Act (Markup held by the Committee on Science.)	H.R. 1081/108–69

Date	Committee on Science List of Hearings with Publication Numbers plus List of Legislative Reports filed in the 108th Congress	Publication Number
Jun. 4, 2003	H.R. 1118, Staffing for Adequate Fire and Emergency Response Firefighters Act of 2003 (Hearing held by the Committee on Science.)	108–15
Jun. 5, 2003	Markup: H.R. 1856, Harmful Algal Bloom and Hypoxia Research Amendments Act of 2003 (Markup held by the Subcommittee on Environment, Technology, and Standards.)	H.R. 1856/H.Rept. 108–326, Pt. 1
Jun. 5, 2003	Manufacturing R&D: How Can the Federal Government Help? (Hearing held by the Subcommittee on Environment, Technology, and Standards.)	108–11
Jun. 10, 2003	The Future of University Nuclear Science and Engineering Programs (Hearing held by the Subcommittee on Energy.)	108–12
Jun. 11, 2003	U.S.–Russian Cooperation in Space (Hearing held by the Subcommittee on Space and Aeronautics.)	108–25
Jun. 12, 2003	Plant Biotechnology Research and Development in Africa: Challenges and Opportunities (Hearing held by the Subcommittee on Research.)	108–16
Jun. 26, 2003	Markup: H.R. 1085, NASA Flexibility Act of 2003 and H.R. 2734, Federal Aviation Administration Research and Development Authorization Act (Markup held by the Subcommittee on Space and Aeronautics.)	H.R. 1085/108–69 H.R. 2734/108–69
Jul. 9, 2003	H.R. 2183, Minority Serving Institution Digital and Wireless Technology Opportunity Act of 2003 (Hearing held by the Subcommittee on Research.)	108–20
Jul. 10, 2003	Competition for Department of Energy Laboratory Contracts: What Is the Impact on Science? (Hearing held by the Subcommittee on Energy.)	108–24

Date	Committee on Science List of Hearings with Publication Numbers plus List of Legislative Reports filed in the 108th Congress	Publication Number
Jul. 15, 2003	NOAA Satellites: Will Weather Forecasting Be Put at Risk? (Hearing held by the Subcommittee on Environment, Technology, and Standards.)	108–19
Jul. 16, 2003	Supercomputing: Is the U.S. on the Right Path? (Hearing held by the Committee on Science.)	108–21
Jul. 17, 2003	H.R. 2692, United States Fire Administration Authorization Act of 2003 (Hearing held by the Subcommittee on Research.)	108–22
Jul. 17, 2003	H.R. 2692, United States Fire Administration Authorization Act of 2003 (Markup held by the Subcommittee on Research.)	H.R. 2692/H.Rept. 108–245
Jul. 22, 2003	Markup: —H.R. 1085, NASA Flexibility Act of 2003; —H.R. 1856, Harmful Algal Bloom and Hypoxia Research Amendments Act of 2003; —H.R. 2608, National Earthquake Hazards Reduction Program Reauthorization Act of 2003; —H.R. 2692, United States Fire Administration Authorization Act of 2003; —H.R. 2734, Federal Aviation Administration Research and Development Reauthorization Act; and, —H.R. 2801, Minority Serving Institution Digital and Wireless Technology Opportunity Act of 2003. (Markup held by the Committee on Science.)	H.R. 1085/108–69 H.R. 1856/H.Rept. 108–326, Pt. 1; H.R. 2608/H.Rept. 108–246, Pt. 1; H.R. 2692/108–69 H.R. 2734/108–69 H.R. 2801/H.Rept. 108–789, Pt. 1.

Date	Committee on Science List of Hearings with Publication Numbers plus List of Legislative Reports filed in the 108th Congress	Publication Number
Jul. 24, 2003	Commercial Human Space Flight (Joint Hearing held by the Subcommittee on Space and Aeronautics, House Committee on Science, and the Subcommittee on Science, Technology, and Space, Senate Committee on Commerce, Science, and Transportation.)	108–26
Sept. 4, 2003	The Columbia Accident Investigation Board Report (Hearing held by the Committee on Science.)	108–27
Sept. 10, 2003	NASA's Response to the Columbia Report (Hearing held by the Committee on Science.)	108–28
Sept. 25, 2003	Keeping the Lights On: Removing Barriers to Technology to Prevent Blackouts (Hearing held by the Subcommittee on Energy.)	108–23
Oct. 8, 2003	Markup: —H.R. 3245, Commercial Space Act of 2003; —H.R. 912, Charles 'Pete' Conrad Astronomy Awards Act —H.R. 1292, Remote Sensing Applications Act of 2003; and, —H.R. 2450, Human Space Flight Independent Investigation Commission Act of 2003 (Markup held by the Subcommittee on Space and Aeronautics.)	H.R. 3245/108–69 H.R. 912/H.Rept. 108–418; H.R. 1292/H.Rept. 108–423; H.R. 2450/108–69
Oct. 16, 2003	Markup: H.Con.Res. 279, Recognizing the significance of the anniversary of the American Association for the Advancement of Science Congressional Science and Engineering Fellowship Program, and reaffirming the commitment to support the use of science in governmental decision-making through such Program; and, H.Res. 395, Recognizing the importance of chemistry to our everyday lives and supporting the goals and ideals of National Chemistry Week.	H.Con.Res. 279/108–69 H.Res. 395/108–69
Oct. 16, 2003	The Future of Human Space Flight (Hearing held by the Committee on Science.)	108–29

Date	Committee on Science List of Hearings with Publication Numbers plus List of Legislative Reports filed in the 108th Congress	Publication Number
Oct. 29, 2003	NASA's Organizational and Management Challenges in the Wake of the Columbia Disaster (Hearing held by the Committee on Science.)	108–30
Oct. 30, 2003	What Is Space Weather and Who Should Forecast It? (Hearing held by the Subcommittee on Environment, Technology, and Standards.)	108–31
Oct. 30, 2003	Implementation of the Math Science Partnership Program: Views From the Field (Hearing held by the Subcommittee on Research.)	108–32
Nov. 5, 2003	H.R. 3245, Commercial Space Act of 2003 (Hearing held by the Subcommittee on Space and Aeronautics.)	108–33
Nov. 5, 2003	Mercury Emissions: State of the Science and Technology (Hearing held by the Subcommittee on Environment, Technology, and Standards.)	108–34
Nov. 6, 2003	What Are the Administration Priorities for Climate Change Technology? (Hearing held by the Subcommittee on Energy.)	108–35
Dec. 4, 2003	[Field Hearing] Review of Non-Oil and Gas Research Activities in the Houston-Galveston-Gulf Coast Area (Hearing held by the Subcommittee on Energy.)	108–36
Dec. 5, 2003	[Field Hearing] Nanotechnology Research and Development: The Biggest Little Thing in Texas (Hearing held by the Committee on Science.)	108–37
Jan. 23, 2004	[Field Hearing] Fueling the High Technology Workforce With Math and Science Education (Hearing held by the Committee on Science.)	108–38

Date	Committee on Science List of Hearings with Publication Numbers plus List of Legislative Reports filed in the 108th Congress	Publication Number
Jan. 23, 2004	[Field Hearing] Tools for Enhancing Small Business Competitiveness in the Dallas Area: A Review of Federal Programs (Hearing held by the Committee on Science.)	108–39
Jan. 28, 2004	Markup: H.R. 3551, Surface Transportation Research and Development Act of 2003 (Markup held by the Subcommittee on Environment, Technology, and Standards.)	H.R. 3551/H.Rept. 108–662, Pt. 1
Feb. 4, 2004	Markup: —H.Con.Res. 189, International Geophysical Year; —H.R. 912, Charles 'Pete' Conrad Astronomy Awards Act; —H.R. 1292, Remote Sensing Applications Act of 2003; —H.R. 3389, To amend the Stevenson-Wydler Technology Innovation Act of 1980 to permit Malcolm Baldrige National Quality Awards to be made to nonprofit organizations; —H.R. 3551, Surface Transportation Research and Development Act of 2004; and, —H.R. 3752, Commercial Space Launch Amendments Act of 2004 (Markup held by the Committee on Science.)	H.Con.Res. 189/H.Rept. 108–422; H.R. 912/H.Rept. 108–418; H.R. 1292/H.Rept. 108–423; H.R. 3389/H.Rept. 108–419; H.R. 3551/H.Rept. 108–662, Pt. 1; H.R. 3752/H.Rept. 108–429
Feb. 9, 2004	[Field Hearing] Strengthening Windstorm Hazard Mitigation: An Examination of Public and Private Efforts (Hearing held by the Committee on Science.)	108–40
Feb. 11, 2004	An Overview of the Federal R&D Budget for Fiscal Year 2005 (Hearing held by the Committee on Science.)	108–41
Feb. 12, 2004	U.S. Vision for Space Exploration (Hearing held by the Committee on Science.)	108–42

Date	Committee on Science List of Hearings with Publication Numbers plus List of Legislative Reports filed in the 108th Congress	Publication Number
Feb. 25, 2004	The Conflict Between Science and Security in Visa Policy: Status and Next Steps (Hearing held by the Committee on Science.)	108–43
Mar. 3, 2004	Reviewing the Hydrogen Fuel and FreedomCAR Initiatives (Hearing held by the Committee on Science.)	108–44
Mar. 10, 2004	Perspectives on the President's Vision for Space Exploration (Hearing held by the Committee on Science.)	108–45
Mar. 11, 2004	Fiscal Year 2005 EPA Budget (Hearing held by the Subcommittee on Environment, Technology, and Standards.)	108–46
Mar. 17, 2004	H.R. 3970, Green Chemistry Research and Development Act of 2004 (Hearing held by the Committee on Science.)	108–47
Mar. 18, 2004	The 2003 Presidential Awardees for Excellence in Math and Science Teaching: A Lesson Plan for Success (Hearing held by the Committee on Science.)	108–48
Mar. 18, 2004	NASA–Department of Defense Cooperation in Space Transportation (Hearing held by the Subcommittee on Space and Aeronautics.)	108–49
Mar. 24, 2004	Priorities in the Department of Energy Budget for Fiscal Year 2005 (Hearing held by the Subcommittee on Energy.)	108–50
Mar. 24, 2004	H.R. 3980, National Windstorm Impact Reduction Act of 2004 (Hearing held jointly by the Subcommittee on Research and the Subcommittee on Environment, Technology, and Standards.)	108–51
Mar. 30, 2004	H.R. 4030, Congressional Medal for Outstanding Contributions in Math and Science Education Act (Hearing held by the Subcommittee on Research.)	108–52

Date	Committee on Science List of Hearings with Publication Numbers plus List of Legislative Reports filed in the 108th Congress	Publication Number
Apr. 1, 2004	Lunar Science and Resources: Future Options (Hearing held by the Subcommittee on Space and Aeronautics.)	108–53
Apr. 28, 2004	Fiscal Year 2005 National Institute of Standards and Technology Budget: Views From Industry (Hearing held by the Subcommittee on Environment, Technology, and Standards.)	108–54
May 3, 2004	Bioterrorism Preparedness: People, Tools, and Systems for Detecting and Responding to a Bioterrorist Attack (Hearing held by the Committee on Science.)	108–56
May 5, 2004	U.S. Commission on Ocean Policy Preliminary Report (Hearing held by the Committee on Science.)	108–57
May 12, 2004	H.R. 4107, Assistance to Firefighters Grant Reauthorization Act of 2004 (Hearing held by the Committee on Science.)	108–58
May 13, 2004	H.R. 4218, High-Performance Computing Revitalization Act of 2004 (Hearing held by the Committee on Science.)	108–55
May 19, 2004	The Impact of Federal Energy Efficiency and Renewable Energy R&D Programs (Hearing held by the Subcommittee on Energy.)	108–59
May 19, 2004	Homeland Security Research and Development at the EPA: Taking Stock and Looking Ahead (Hearing held by the Subcommittee on Environment, Technology, and Standards.)	108–60
May 20, 2004	An Examination of H.R. 3890, A Bill to Reauthorize the Metals Program at the Department of Energy (Hearing held by the Subcommittee on Energy.)	108–61
Jun. 4, 2004	[Field Hearing] Transportation Research and Development: Applications and Opportunities in the Denver Region (Hearing held by the Committee on Science.)	108–62

Date	Committee on Science List of Hearings with Publication Numbers plus List of Legislative Reports filed in the 108th Congress	Publication Number
Jun. 21, 2004	[Field Hearing] The Assistance to Firefighters Grant Program: A View From Upstate New York (Hearing held by the Committee on Science.)	108–63
Jun. 24, 2004	Nuclear R&D and the Idaho National Laboratory (Hearing held by the Subcommittee on Energy.)	108–64
Jun. 24, 2004	Testing and Certification for Voting Equipment: How Can the Process Be Improved? (Hearing held by the Subcommittee on Environment, Technology, and Standards.)	108–65
Jul. 15, 2004	NASA Contests and Prizes: How Can They Help Advance Space Exploration? (Hearing held by the Subcommittee on Space and Aeronautics.)	108–66
Jul. 15, 2004	The National Oceanic and Atmospheric Administration Organic Acts (Hearing held by the Subcommittee on Environment, Technology, and Standards.)	108–67
Jul. 21, 2004	Cyber Security Education: Meeting the Needs of Technology Workers and Employers (Hearing held by the Committee on Science.)	108–68
Sept. 29, 2004	H.R. 4546, National Oceanic and Atmospheric Administration Act (Markup held by the Committee on Science.)	H.R. 4546/108–69
Dec. 31, 2004	H.Con.Res. 279, H.Res. 395, H.R. 766, H.R. 1081, H.R. 1085, H.R. 1297, H.R. 1578, H.R. 2450, H.R. 2692, H.R. 2734, H.R. 3245, H.R. 4546 (Compilation of Markups held by the Committee on Science that were not published as part of a legislative report.)	108–69
Apr. 2004	A Compilation of Federal Science Laws As Amended Through December 31, 2003 (Committee Print)	108–A

○