

Statement of Dr. John Marburger, III
Director, Office of Science and Technology Policy
to the
Subcommittee on Commerce, Justice, Science and Related Agencies
Committee on Appropriations
United States House of Representatives
February 26, 2008

Chairman Mollohan, Ranking Member Frelinghuysen, and members of the Subcommittee, I am pleased to appear before you once again to present the President's Fiscal Year 2009 research and development (R&D) budget. In the eighth and final year of this Administration, today's hearing provides an opportunity to take stock of how far we have come, where we are today, and, most importantly, what remains to be done for U.S. science and technology.

Last year, the Administration asked this Subcommittee to fund the American Competitiveness Initiative (ACI). With initial House passage of the FY 2008 Commerce, Justice, Science and Related Agencies Appropriations Act you delivered that support. Your strong efforts on behalf of American innovation and competitiveness were formally recognized in the Statement of Administration Policy on that bill which read:

“The Administration commends the Committee’s implementation of ACI with its strong support for the National Science Foundation (NSF) and the standards and research activities of the National Institute of Standards and Technology.”

Unfortunately this Subcommittee's good work was not ultimately realized in the 2008 Omnibus funding bill, but I urge you to maintain your commitment. I can assure you that this Administration remains firmly committed to the ACI, as attested by the President's words in last month's State of the Union address:

“To keep America competitive into the future, we must trust in the skill of our scientists and engineers and empower them to pursue the breakthroughs of tomorrow. Last year, Congress passed legislation supporting the American Competitiveness Initiative, but never followed through with the funding. This funding is essential to keeping our scientific edge. So I ask Congress to double federal support for critical basic research in the physical sciences and ensure America remains the most dynamic nation on Earth.”

Increased funding for critical basic research in the physical sciences is my highest budget priority. This Subcommittee has led by fully funding these basic research increases last year. We now must succeed in implementing ACI with actual funding. If we fail, it will significantly impair and delay all our efforts to strengthen long-term economic competitiveness through innovation-enabling basic research in the physical sciences and engineering. Lost research time delays innovations, slows development, misses market opportunities, and costs jobs and economic growth.

The basic research programs prioritized in the ACI and authorized in the America COMPETES Act remain in an under-funded state relative to their importance for the long term strength of our Nation's economy. The National Science Foundation, the Department of Energy's Office of Science, and the National Institute of Standards and Technology's core lab research and facilities provide basic research infrastructure for every field of science, and produce the new knowledge that make technology breakthroughs possible. This Subcommittee has a commendable history of bipartisan support for science funding, for effective advocacy of basic scientific research, and for its technical applications that benefit every part of our society. On behalf of the Administration, I thank the Subcommittee for the good working relationship it has established with the science agencies and with my office, and look forward to working together for robust funding of our mutual innovation and competitiveness agenda.

Overall, Federal R&D in the 2009 Budget is \$147 billion, \$4 billion more than FY 2008. That represents one out of every seven dollars requested by the President in the discretionary budget. This total exceeds the Fiscal Year 2001 amount by \$56 billion and represents growth of 61 percent since then. Over these eight years, the cumulative Federal R&D investment will total over \$1 trillion.

The growth in non-defense R&D is even more dramatic in the 2009 Budget. The President is seeking a six percent increase in this category. By comparison, the remainder of the non-security discretionary budget is up less than 1 percent. And I draw your attention to the chart of Federal non-defense spending over time (Attachment 1). With the 2009 Budget, real growth in outlays for the conduct of non-defense R&D, with the effect of inflation accounted for, is up 31 percent in eight years. Real non-defense R&D growth for the previous eight years was 11 percent. The President's commitment to the government's R&D enterprise is strong, and the advancement of science remains among his top budget priorities.

America COMPETES Act of 2007: This bipartisan Act authorized many existing and new programs which the President's Budget prioritizes in a straightforward way: The Administration has accepted the conclusions of many studies and reports that funding for ACI basic research is most important and needs to be addressed first. This prioritization reflects a broad endorsement by the business and academic communities (Attachment 2).

Prioritizing within the constraints of budget realities necessarily means that some of the programs and activities authorized in the America COMPETES Act could not be requested in this Budget. The lack of funding in the 2008 Omnibus funding bill for the priority basic research increases authorized in the America COMPETES Act makes it even more imperative to address these priorities in the forthcoming fiscal year.

Earmarks: Before summarizing this year's research budget, because research earmarks returned in the 2008 appropriations, I want to express my concern about the very serious impact earmarks have on the science budget.

In FY 2008, DoD basic and applied research earmarks total about \$1.1 billion (about 1/6 of DoD research's total budget); \$124 million of the DoE Office of Science is earmarked; and \$83 million in earmarks and unrequested grants seriously dilute the core research and facilities

proposed at the National Institute of Standards and Technology. Altogether, research earmarks are estimated at \$2 billion of the \$16.8 billion of overall appropriations earmarks government-wide in FY 2008. In nominal terms, this is more than the \$1.8 billion increase in the overall FY 2008 Federal Science & Technology (FS&T) budget and earmarks therefore result in a real cut in merit-reviewed research at the agencies that are included in the FS&T budget. Sustained U.S. competitiveness depends on pursuing the best science. I hope the Congress will significantly reduce research earmarks in the FY 2009 appropriations process, as it did so commendably in fiscal year 2007. Congress has wisely not subjected NSF and the National Institutes of Health to earmarking, and it is now time to end this practice for all research programs.

Basic Research: Turning to overall Basic Research in the 2009 Budget, \$29.3 billion is requested, an \$850 million increase. If earmarks were abandoned, the real programmatic benefit would be even larger. I want to emphasize that this favorable treatment of Basic Research is occurring in a year of spending reductions for many other domestic programs, indicating the high priority this Administration places on the importance of this activity.

ACI: As described above, the centerpiece of the Administration's Basic Research agenda is the American Competitiveness Initiative. The 2009 Budget calls for a 15 percent or, \$1.6 billion, increase for the ACI's three priority science agencies: the National Science Foundation; DoE's Office of Science; and the laboratories of the National Institute of Standards and Technology. This \$12.2 billion of total funding is necessary to recover the momentum we lost by not funding these priority agencies last year (Attachment 3).

Complementing these increases, planned basic research at the Department of Defense will grow by \$270 million over the FY 2008 request—a 19 percent increase, yielding a total of \$1.7 billion—consistent with the President's commitment to support high value research in the physical sciences. These investments are made to support national security but, due to the broad effects of basic research, also contribute to ACI innovation goals.

Climate Science: While long term innovation and competitiveness are the priority drivers in the 2009 Federal R&D budget, other science areas remain important to National goals. Since FY 2001, the Administration will spend approximately \$14.6 billion on climate change science research through the multi-agency Climate Change Science Program. The President's 2009 CCSP budget exceeds \$2 billion, a 12 percent increase over FY 2008 enacted. The U.S. leads the world in advancing climate change policy and programs, with planned expenditures of nearly \$9 billion in climate-related science, technology, international assistance, and tax incentive programs proposed in FY 2009 – much more than any other country and a nine percent increase over 2008 enacted levels.

Earth Observations and Ocean Initiative: In other programs relevant to the environment, the 2009 Budget includes increased funding for a number of Earth Observation programs, most notably \$74 million for the National Oceanic and Atmospheric Administration (NOAA) to sustain the highest priority climate measurement capabilities that once were part of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) program, and \$103 million for NASA to embark on the new series of space-based Earth observing missions recommended by the National Research Council's recent Earth Sciences Decadal Survey. A new

National Land Imaging Program office to ensure long-term continuity of multi-spectral imaging of the Earth's surface is established in the U.S. Geological Survey (USGS). This year's Budget again includes the Administration's Ocean Initiative, which calls for \$102 million for ocean science and research at NOAA, NSF and the USGS.

Information Technology: President Bush's FY 2009 Budget of \$3.5 billion for Networking and Information Technology R&D (NITRD) represents a doubling since 2001. This brings the eight year total investment in this area to more than \$20.9 billion. The 2009 Budget emphasizes the NITRD priorities of high-end computing R&D and infrastructure, advanced networking, and cyber security and information assurance. The tools and capabilities that result from the NITRD program affect every area of science and technology and enhance the Nation's competitiveness.

Nanotechnology: This Administration's National Nanotechnology Initiative (NNI) continues strong with over \$1.5 billion in FY 2009 for this well-coordinated multi-agency, investment in fundamental research, multi-disciplinary centers of excellence, and development of focused cutting-edge research and education infrastructure. With the 2009 request, nearly \$10 billion will have been invested in nanoscale R&D in seven years. The NNI includes important research on the societal implications of nanotechnology, including human and environmental health and methods for managing potential risks.

SUBCOMMITTEE AGENCY BUDGET HIGHLIGHTS

National Science Foundation (NSF):

Funds are requested to increase the budget for NSF to \$6.85 billion in FY 2009, 14 percent or \$822 million above 2008's \$6.03 billion. As one of the three key agencies in the American Competitiveness Initiative, NSF is the primary source of support for university and academic research in the physical sciences, funding potentially transformative basic research in areas such as nanotechnology, advanced networking and information technology, physics, chemistry, material sciences, mathematics and engineering. The NSF physical sciences directorates receive increases of about 20 percent.

NSF is a primary lead for two previously mentioned Administration priority research areas that promise to strengthen the Nation's economy: the National Nanotechnology Initiative (NNI) and the Networking and Information Technology R&D program (NITRD). NSF-funded nanotechnology research, sustained at \$397 million in FY 2009, a 165 percent increase since 2001, has advanced our understanding of materials at the molecular level and has provided insights into how innovative mechanisms and tools can be built atom by atom. This emerging field holds promise for a broad range of developing technologies, including higher-performance materials, more efficient manufacturing processes, higher-capacity computer storage, and microscopic biomedical instruments and mechanisms. NSF's investments in NITRD, funded at \$1.1 billion in 2009, up \$159 million over 2008 and 71 percent since 2001, support all major areas of basic information technology (IT) research. NSF also incorporates IT advances in its science and engineering applications, supports computing and networking infrastructure for research, and contributes to IT-related education for scientists, engineers, and the IT workforce.

NSF will continue to support the development of a petascale computing capability widely accessible to the science and engineering community. A new \$20 million cross-Foundation investment that is part of both the NNI and NITRD, Science and Engineering Beyond Moore's Law, is a multi-disciplinary effort to advance the fundamental science and technology of semiconductor electronics.

The 2009 NSF Education and Human Resources (EHR) budget will continue efforts to prepare U.S. students for the science and engineering workforce with a nine percent overall increase (+\$65 million) over the level in the 2008 Omnibus. Specifically, the 2009 EHR Budget provides a five percent increase for the Math and Science Partnerships program at NSF, and a seven percent increase for the Noyce Scholarship program. NSF-wide Graduate Research Fellowships are proposed for a 32 percent increase and will support an additional 700 graduate students.

NSF's investment in Cyber-enabled Discovery (CDI), begun in FY 2008, more than doubles for a total of \$100 million in FY 2009. The CDI investment promotes the advancement of science and engineering along fundamentally new pathways opened by computational thinking.

NSF will continue to fund research on cybersecurity foundations, network security, and systems software that supports the objectives of the *Federal Plan for Cyber Security and Information Assurance Research and Development*. Emphasis will be placed on usability, privacy, and theoretical foundations.

National Institute of Standards and Technology (NIST):

The Department of Commerce's NIST "core" research and facilities receive \$634 million in 2009, an increase of 22 percent over the 2008 Omnibus after accounting for earmarks and unrequested grants. In 2009, the American Competitiveness Initiative proposes NIST funding increases of nearly \$114 million for new initiatives in research and measurements in high-leverage areas such as nanotechnology manufacturing; expanding NIST's neutron facility to aid in characterizing novel materials in high-growth research fields; and improving our understanding of complex biological systems to accelerate innovations and enable investment in biosciences, including disease diagnosis and treatment.

National Aeronautics and Space Administration (NASA):

The President's 2009 Budget for NASA is \$17.6 billion, a three percent increase over FY 2008, reflecting a steady commitment by the Administration to the continued execution of the Vision for Space Exploration and to using the Shuttle to assemble the International Space Station until the Shuttle retires in 2010. Maintaining NASA budget appropriations is extremely important for the continued viability of its programs.

In 2009, NASA requests \$3.5 billion in direct costs for exploration systems including the Orion Crew Exploration Vehicle (CEV) and the Ares I launch vehicle that will carry astronauts to the Moon. 2009 will see the Ares I-X test flight, the first test flight of the Ares I launch vehicle. Ares I-X will involve a first stage with a functional four segment solid rocket booster and an inactive fifth segment, and an upper stage mass simulator. Ares I-X will test first-stage flight

dynamics, controllability, and separation of the first and upper stages. Having already initiated the acquisition process for certain elements of this architecture during 2006, NASA now has all Orion CEV and Ares I elements under contract with the first crewed-flight planned to occur in 2015.

The 2009 Budget requests \$4.44 billion in direct costs to continue operating the nearly 60 spacecraft of NASA's Science Mission Directorate and to support investments in future Earth and space science missions, vital technologies, and frontier research. NASA will launch seven new Earth observing missions in the next several years, including projects such as the Landsat Data Continuity Mission and the Global Precipitation Measurement mission. In a significant new initiative, NASA also will embark upon a series of high-priority, space-based Earth observing missions, informed by the recommendations of the National Research Council's recent Decadal Survey on earth sciences. At the same time, NASA will continue its roles in the interagency Climate Change Science Program and the international initiative on the Global Earth Observing System of Systems. NASA will expand its program of scientific exploration of the Moon through a new series of low-cost robotic missions that will advance our knowledge of Earth's closest neighbor as we prepare for a human return to the Moon. Following up ongoing missions to Mars, Saturn and Mercury, NASA also will send ever-more-capable spacecraft to Mars and other outer planets. In addition, NASA will continue its vibrant astrophysics and astronomy efforts through programs such as Beyond Einstein and the Great Observatories, and will upgrade the Hubble Space Telescope in late 2008 to provide five more years of productive on-orbit life. NASA also will maintain its important heliophysics research through projects such as the Radiation Belt Storm Probes.

In December 2007, the President approved the Nation's first National Plan for Aeronautics R&D and Related Infrastructure. Consistent with this Plan, the 2009 NASA aeronautics budget prioritizes fundamental aeronautics research, the improvement of aviation safety, and research supporting the development of the Next Generation Air Transportation System. In addition, NASA will continue to address infrastructure upgrades and maintenance requirements for aeronautical test facilities across NASA centers that are of vital importance to the Nation. The 2009 budget requests \$447 million for NASA aeronautics direct costs.

National Oceanic and Atmospheric Administration (NOAA):

For NOAA in the Department of Commerce, the 2009 Budget provides \$383 million for Oceanic and Atmospheric Research (OAR), 22 percent more than in FY 2001. OAR provides for ongoing research on climate, weather, air quality, and ocean processes.

The FY 2009 NOAA budget again requests \$20 million for oceans science and research (with another \$20 million from NSF and USGS) as part of a \$40 million interagency effort to implement the Ocean Research Priorities Plan called for in the President's U.S. Ocean Action Plan. Unfortunately, the 2008 Omnibus provided about 10 percent of the \$40 million requested. Nevertheless, the President remains committed to enhancing ocean science that will make our oceans, coasts and Great Lakes cleaner, healthier and more productive and is again requesting new funding to support efforts in these areas. The \$20 million will address the four near-term ocean research priorities established by the Ocean Research Priorities Plan and Implementation

Strategy, published in January 2007. The NOAA Budget also proposes \$8 million to continue extended continental shelf scientific analysis to define and map its U.S. outer limits and \$23 million to develop an operational ocean monitoring network.

Office of Science and Technology Policy (OSTP):

As you know, the Subcommittee also funds OSTP's own budget. After sustaining a six percent cut in FY 2008, we are requesting \$5.3 million in the 2009 Budget. This amount is \$119,000 above the FY 2008 appropriation, but \$215,000 below the FY 2008 request. FY 2009 will take OSTP through the end of the current Administration and the beginning of the next Administration. Full funding of the OSTP request is important for both of these transition phases to proceed smoothly. The next Administration will undoubtedly propose an organization and funding level for OSTP to fulfill the agency's functions in FY10 and beyond. The current request reflects our desire to continue to fulfill OSTP's mission in a robust manner to the end of the current term, and to provide the new Administration with flexibility to bring OSTP rapidly to an effective level of operation.

OSTP also seeks full funding for the Science and Technology Policy Institute (STPI) within NSF's request. STPI is a congressionally-chartered Federally Funded Research and Development Center that provides excellent objective, technical support to OSTP and other agencies. Because the congressional statute mandates that NSF sponsor STPI, OSTP requests that this amount be fully funded within the NSF budget in support of OSTP's mission. We have included such language in the OSTP budget narrative in response to the 2008 Omnibus report language that directed OSTP to request this funding.

CONCLUSION

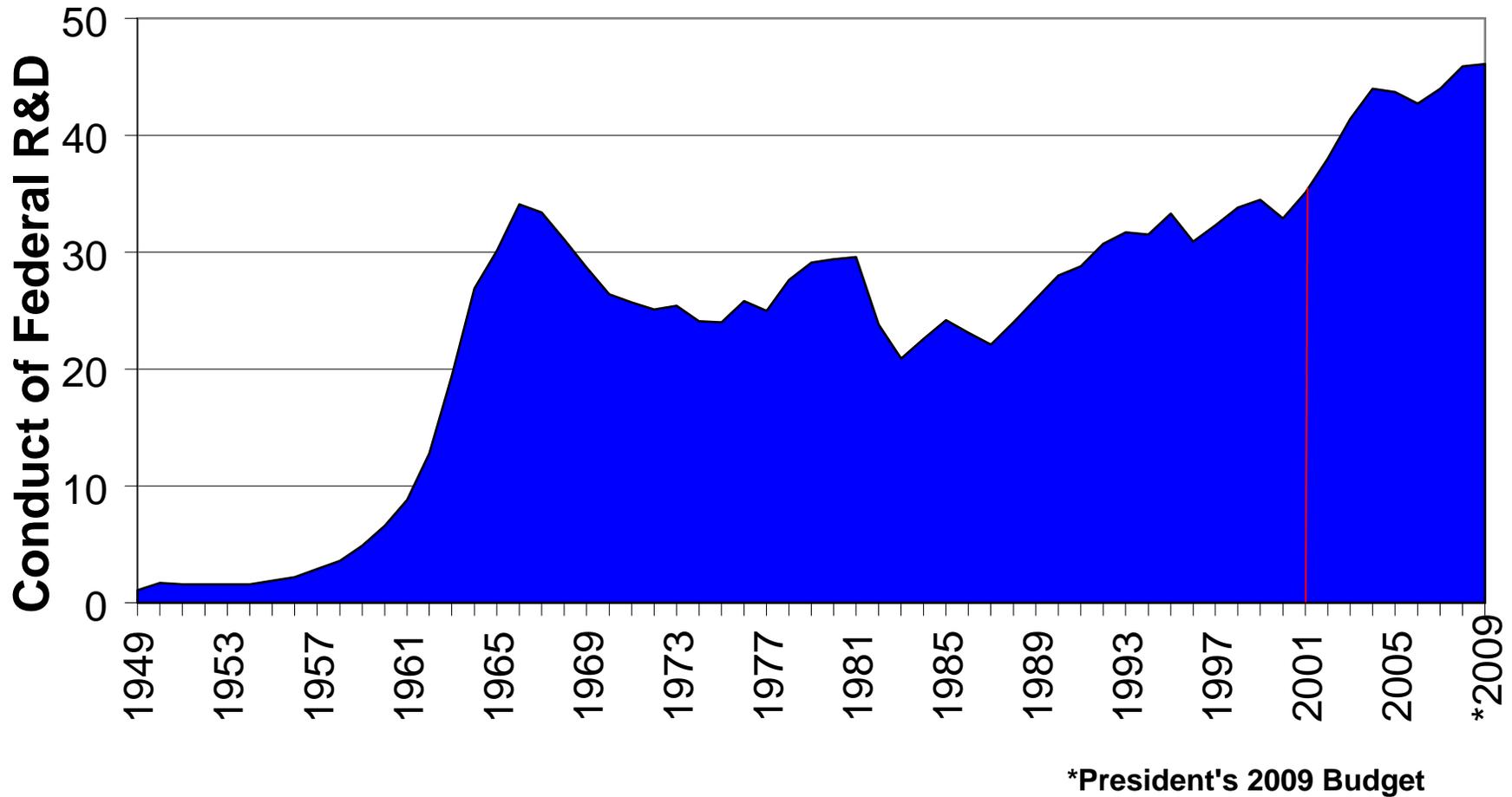
Making choices is difficult even when budgets are generous, but tight budgets require focused priorities and strong program management. This year's R&D budget proposal provides robust levels of investment that allow America to maintain its leadership position in science and move ahead in selected priority areas. The ACI properly focuses R&D investments in areas that will increase our economic competitiveness.

America leads all nations in research and development expenditures. In 2006, U.S. R&D investment at \$340 billion exceeded that of all the other G7 nations combined. After a worldwide slowing in R&D expenditures in the early 1990's, R&D spending rebounded in the late 90's, with the United States experiencing the most robust growth. Our scientists collectively have the best laboratories in the world, the most extensive infrastructure supporting research, the greatest opportunities to pursue novel lines of investigation, and the most freedom to turn their discoveries into profitable ventures if they are inclined to do so. Combined with the merit review process that has ensured the quality of American science in the past half century, these factors make American science the strongest in the world.

This budget will sustain this leadership and maintain science and technology capabilities that are the envy of the world. I ask that Congress fully fund the R&D initiatives advanced in the President's 2009 Budget.

I would be pleased to respond to questions.

Federal Non-Defense R&D Spending (Outlays in billions, constant 2000 dollars)



American Innovation Proclamation

We, the leaders of American business and higher education, call on Congress to act quickly on an innovation agenda that will ensure continued U.S. competitiveness, enabling Americans to succeed in the global economy.

Innovation leadership creates high-wage jobs and rising incomes for Americans. Innovation drives productivity and economic growth, giving American workers the tools to remain the most productive in the world and creating products, processes—and even new industries—that expand employment and boost living standards.

The United States has remained the world's innovation leader through a commitment to basic research, a world-class workforce and a climate that rewards innovation. But America cannot rest on past economic success. Our competitors are investing in innovation, improving their competitive position and, in some respects, surpassing us.

Therefore, Congress must act to:

Renew America's commitment to discovery

by doubling the basic research budgets at the National Science Foundation, the National Institute of Standards and Technology, the Department of Energy's Office of Science and the Department of Defense;

Improve student achievement in math and science

through increased funding of proven programs and incentives for science and math teacher recruitment and professional development;

Welcome highly educated foreign professionals,

particularly those holding advanced science, technology, engineering, or mathematics degrees, especially from U.S. universities, by reforming U.S. visa policies;

Make permanent a strengthened R&D Tax Credit

to encourage continued private-sector innovation investment.

We, the signatories, hereby proclaim our support for these initiatives and stand ready to do our part.


Craig Barrett

Chairman
Intel Corporation


Richard K. Templeton
President & CEO
Texas Instruments


Carl F. Kohn
President & CEO
Battelle


Arthur E. Ryan

Chairman & CEO
Prudential Financial, Inc.


Harold McGraw III
Chairman, President & CEO
The McGraw-Hill Companies, Inc.


Norman R. Augustine
Former Chairman & CEO
Lockheed Martin Corporation


Charles O. Holliday, Jr.

Chairman & CEO
DuPont


Nicholas M. Donofrio
Executive Vice President,
Innovation & Technology
IBM Corporation


Robert C. Dynes
President, University of California

Additional Signatories on the Back.

President Bush's ACI Research Commitment

(in millions of dollars)

ACI Basic Research Agencies	FY 2006 Funding	President's FY 2007 Request	FY 2007 Funding	President's FY 2008 Request	FY 2008 Omnibus	President's FY 2009 Budget	FY 2009 Budget Above FY 2008 Omnibus
NSF	5,582	6,020	5,917	6,429	6,032	6,854	+822
DoE Office of Science	3,596 ²	4,102	3,797	4,398	3,973 ⁵	4,722	+749 ⁸
NIST Core ¹	568 ³	535	493	594	605 ⁶	634	+29 ⁹
ACI Total	9,747 ⁴	10,657	10,207	11,421	10,610 ⁷	12,210	+1,600 ¹⁰

¹ NIST Core consists of NIST lab research and construction accounts

² Includes \$135 million in earmarks

³ Includes \$137 million in earmarks

⁴ Includes \$272 million in earmarks

⁵ Includes \$124 million in earmarks

⁶ Includes \$83 million in earmarks and unrequested grants

⁷ Includes \$207 million in earmarks and unrequested grants

⁸ +\$873 million after accounting for earmarks.

⁹ +\$112 million after accounting for earmarks and unrequested grants

¹⁰ +\$1,807 million after accounting for earmarks and unrequested grants