

**TESTIMONY OF  
DEPUTY SECRETARY THEODORE W. KASSINGER  
U.S. DEPARTMENT OF COMMERCE  
BEFORE THE  
COMMITTEE ON SCIENCE  
UNITED STATES HOUSE OF REPRESENTATIVES  
February 16, 2005**

Mr. Chairman and Members of the Committee, I am pleased to join you today as we examine the Administration's budget request for research and development at the Department of Commerce and the Department's role in reinforcing America's technological leadership. I want to thank the Committee, especially Chairman Boehlert, for your continued support and leadership on innovation issues, as well as your support for NOAA's part in the Administration's tsunami initiative. You have been a constant and strong voice for the science and technology community. I look forward to continuing our work together with you and the other Members of the Committee to ensure that America remains the world leader in the science and technology field.

## **INTRODUCTION**

The Department of Commerce works to create the conditions for economic growth and opportunity for all Americans by promoting innovation, entrepreneurship, competitiveness, and stewardship. We provide tools to help maximize U.S. competitiveness and enable economic growth for American industries, workers, and consumers. Of particular importance to this Committee is the work that Commerce does in fostering America's science and technological leadership by conducting basic research and experimentation, enhancing technical standards, advancing measurement science, and promoting environmental stewardship.

Maintaining America's technological leadership is important not just for our nation's national security, but also to ensure continued U.S. economic growth. Science and technology are the pistons that help propel the American engine of prosperity. This Administration's commitment to science and technology continues to foster the conditions for both economic growth and employment opportunity. These investments in science and technology provide the catalyst that enables private enterprises to provide our nation and our people with good jobs, a better quality of life, and inventions that have established our national identity.

The President understands the opportunity science and technology provide to enhance the lives of all Americans. The President's focus in the area of science and technology is reflected in the Department of Commerce R&D portfolio. The Commerce budget maintains substantial R&D investments in two of our bureaus, the Technology Administration (TA) (which includes the National Institute of Standards and Technology (NIST) and the National Technical Information Service) and the National Oceanic and Atmospheric Administration (NOAA). The overall FY 2006 budget request for TA is \$536.2 million, a small increase over our FY 2005 request. However, the request represents an increase of over \$47 million from the FY 2005 enacted amount for NIST's core laboratory programs, the NIST programs most effective and necessary in supporting the fundamental scientific understanding and technological needs of

U.S.-based businesses, American workers, and the domestic economy. For FY 2006, we will be seeking program increases of \$19.6 million for advanced manufacturing research, \$3.0 million for measurements and standards work related to homeland security, \$17.2 million for measurement infrastructure improvements, and \$35.4 million for high priority facilities modernization and maintenance needs. For NOAA, we are requesting \$3.6 billion, an increase of \$205 million from our FY 2005 request. Of the increase, \$94.7 million will support requirements to build an integrated Earth observing system.

While the focus of this testimony is on TA/NIST and NOAA, I should also note that the United States Patent and Trademark Office (USPTO) and the National Telecommunications and Information Administration (NTIA) play significant roles in promoting the Department of Commerce's technology goals. USPTO ensures that the intellectual property system contributes to a strong global economy, encourages investment in innovation, and fosters entrepreneurial spirit. NTIA works to spur innovation by promoting efficient use of federal radio spectrum and encouraging the development and implementation of new and emerging telecommunications technologies, helping consumers and creating jobs.

The Technology Administration and its various components seek to maximize technology's contribution to economic growth, high-wage job creation, and the social well-being of the United States. TA and NIST not only serve as advocates for technological innovation but also analyze the factors that affect our competitiveness and develop the tools needed to enhance productivity, trade, and, in the end, the quality of life for all Americans. In addition, NIST is engaged in critical research in high-priority areas of technological innovation such as nanotechnology, information technology, biotechnology, and manufacturing technology. NIST is also conducting research in response to the World Trade Center tragedy and the February 2003 nightclub fire in Rhode Island to better prepare facility owners, contractors, architects, engineers, emergency responders, and regulatory authorities to respond to future disasters.

The National Oceanic and Atmospheric Administration's mission is to understand and predict changes in the Earth's environment, as well as to conserve and manage coastal and marine resources to meet our nation's economic, social, and environmental needs. The work performed at NOAA touches the daily lives of every person in the United States and in much of the world. The agency

- provides weather, water, and climate services;
- manages and protects marine resources ecosystems;
- conducts atmospheric, climate, and ecosystems research;
- promotes efficient and environmentally safe commerce and transportation; and
- provides emergency response and vital information in support of homeland security.

In addition to using science and technology to create jobs and improve economic prosperity, the Department is also directing resources toward disaster prevention, to better understand and minimize the loss of life and property from disasters.

In January 2005, the Administration announced that the U.S. tsunami detection and warning capabilities would be expanded as a contribution to the Global Earth Observation

System of Systems (GEOSS). NOAA's advanced technology will create an expanded tsunami warning system that is expected to be fully operational by 2007. These programs will help NOAA improve public safety and economic security in the United States and throughout the world.

Currently, NOAA leads the Nation and world in ocean and ecosystem science, policy and management. In December 2004, the Administration released the "U.S. Ocean Action Plan," a response to the U.S. Commission on Ocean Policy's report entitled, "An Ocean Blueprint for the 21<sup>st</sup> Century." Working under the leadership of the Council on Environmental Quality, and with several other agencies, NOAA substantially assisted in the development of this action plan. NOAA will play a key role in implementing many of the ocean policy measures that it contains, including supporting the establishment of a coordinated ocean governance structure. Consistent with this approach, the Administration continues to support Commerce's leadership role in oceans policy and activities by promoting passage of a NOAA Organic Act. We look forward to discussing this with you further when you consider this legislation.

NOAA's global leadership also extends to monitoring the planet through the development of the GEOSS. The GEOSS will provide NOAA and others with the tools to better understand our planet through an integrated, comprehensive, and sustained Earth observation program.

NOAA leads the Administration's interagency Climate Change Science Program. As needs for water, climate, and air quality information increase worldwide, NOAA has been working to improve our understanding of climate and helping develop products and services that provide useful information for national and regional management decisions. One example of this is the National Integrated Drought Information System (NIDIS), which provides early drought warning on a regional level.

## **HIGHLIGHTS OF THE FY 2006 BUDGET REQUEST**

### **Technology Administration Programs**

The mission of the Technology Administration (TA), which includes the Under Secretary of Commerce for Technology and two major components, the National Institute of Standards and Technology (NIST) and the National Technical Information Service (NTIS), is to maximize technology's contribution to America's economic growth. In addition, the agency seeks to encourage the development of the technological infrastructure required to support U.S. industry through the 21st Century; to foster the development, diffusion, and adoption of new technologies; and to create a business environment conducive to innovation.

The Department requests \$4.2 million for the Office of the Under Secretary for Technology (TA/US). The Administration proposes to streamline the administrative and policy operations of the Technology Administration's Office of the Under Secretary. The Office of the Under Secretary, in its technology policy leadership role, will continue to provide policy guidance to the Secretary of Commerce and the Technology Administration's component agencies, serve as an interagency leader on key Administration technology initiatives, lead the National Medal of

Technology Program, participate in the President's National Science and Technology Council's Committee on Technology, promote Administration policies for innovation and industrial competitiveness within and outside government, and provide leadership within the Department as chair of the Commerce Coordinating Council for Technology. The Under Secretary's office will continue to coordinate the civilian science and technology efforts of federal agencies and help to shape federal civilian R&D priorities after considering the views of industry. The Under Secretary will continue to provide counsel to the Secretary of Commerce on all matters affecting innovation, and coordinate with counterpart offices in the trade and economic agencies to create unified, integrated trade and technology policies.

### **National Institute of Standards and Technology**

NIST's proposed \$532 million budget request for FY 2006 focuses the Institute's resources on addressing the critical national priorities that can best be served by the Institute's unique cross-disciplinary expertise in science and technology. As noted above, the request includes a \$47 million increase for NIST's core laboratory programs. The NIST budget request for FY 2006 also reflects the President's concern for focusing intently on other national priorities. While the request covers strategic investments in Institute capabilities, it still helps meet the President's overall budget goals by reducing NIST's budget more than \$163 million compared with FY 2005 appropriations, accomplished by shifting resources from lower-priority programs.

### **Advances in Manufacturing (\$19.6 million increase)**

The Department is requesting a \$19.6 million increase for NIST in Advanced Manufacturing research. The growth of the global economy – the rapid exchange of goods and technologies – has placed unprecedented pressures on the Nation's manufacturing sector. Most observers agree that if the United States is to compete successfully, it must be on the basis of sustained, superior innovation in all aspects of manufacturing. We must lead the pack. Innovation must go further than new products and processes, however. The United States must innovate in the business of manufacturing, improving efficiencies and continuing the productivity increases that have sustained the manufacturing sector since the Second World War.

- **National Nanomanufacturing and Nanometrology Facility (N<sup>3</sup>F) (\$10 million).** The largest major element of NIST's advanced manufacturing initiative is the development of a national "user facility" for nanotechnology research in the AML. The N<sup>3</sup>F will give qualified collaborators from industry and government access to the state-of-the-art laboratories of the AML, the existing nanotechnology expertise of the seven NIST laboratories, and mechanisms for partnering on nanotech projects. Together with public and private sector partners, NIST will use the N<sup>3</sup>F to investigate the fundamental physics, mechanisms and metrology to manipulate matter atom-by-atom, in order to build perfectly defined nanostructures with predefined electronic, mechanical, and quantum properties. N<sup>3</sup>F will offer U.S. industry in a single institution an unmatched measurement infrastructure to compete at the nanoscale.
- **Nanomanufacturing research (\$4 million).** As manufacturing processes and products become ever more sophisticated, the key battlefields of 21st-century manufacturing will depend more and more on excellence in measurement technology. This is true across the board in manufacturing, but nowhere more so than in the rapidly developing field of

nanomanufacturing, where it can be necessary to locate, track and manipulate individual molecules and atoms. NIST's nanomanufacturing research effort will concentrate on delivering the critical measurement technology and standards infrastructure across the broad spectrum of science and engineering that is "nanotechnology," including nanodevices (mechanical and electronic), nanomagnetics, nanomanipulation, and nanoscale materials characterization. NIST is uniquely positioned for this work not only because of its long history of expertise in measurement research, but also because of the recent completion of its Advanced Measurement Laboratory (AML), which offers a unique collection of state-of-the-art precision measurement labs.

- **Manufacturing enterprise integration (\$1.6 million).** America's large manufacturers are globally distributed enterprises. They rely on a system of small manufacturers, part suppliers, shippers, and raw materials producers organized in extended enterprises called supply chains. Successfully managing production throughout the supply chain is critical to the competitiveness of these extended enterprises. Production costs are no longer the major cost drivers in these global supply chains – the dominant factor is the cost of engineering and business activities. But many small manufacturers not equipped to do business in these sophisticated, distributed enterprises are being left out and are in danger of failure. One independent economic study commissioned by NIST shows that the automotive supply chain alone loses \$1 billion annually due to inefficient engineering and business data exchanges. NIST proposes a wide-ranging program to work with U.S. manufacturers to create a "roadmap" for the development of open standards for enterprise integration, to develop and test standards and standard conformance tests, and to ensure that they are integrated and consistent with developing international standards.
- **Expanding access to global markets through measurements and standards (\$4 million).** Even with superior technology, American manufacturers can be effectively locked out of profitable foreign markets through artificial barriers of local standards and regulations. Knocking down these barriers – or preventing them from being raised in the first place – is an issue of international standards, harmonization, and measurement compatibility, again, part of NIST's core expertise. Eighty percent of global merchandise trade is influenced by testing and other measurement-related requirements of regulations and standards. U.S. manufacturers need standards and calibrations to be aligned with international standards to give them seamless access to foreign markets. In addition, NIST monitors foreign and international standards efforts for potential impact on U.S. exports. NIST will develop leading-edge measurement capabilities for key technologies and new, more efficient ways to deliver the highly accurate measurements needed by U.S. industry to create and market products based upon new technologies. NIST will continue its efforts to support access to foreign markets through technical leadership and coordination of key trade-related documentary standards activities in specific technology sectors.

### **Measurements and Standards for Homeland Security (\$3 million increase)**

Measurements and standards are increasingly understood to be an important component of homeland security, whether in helping to mitigate the effects of disasters, both natural and man-made, or in helping to ensure the reliability of the new high-tech tools being brought to bear in the war on terrorism. NIST will continue to coordinate its work closely with the Department of Homeland Security and other agencies.

- **Improved standards and guidelines for first responders and buildings (\$1 million).** NIST has long been recognized for its contributions to public safety in building technology — the development of test methods and engineering data to make buildings safer and more resistant to earthquakes and fire, for example — but the increased risk of terrorist attacks since September 11, 2001, has added to natural disasters a new dimension of deadly, human-engineered threats. A private-sector coalition representing the key industry, standards, codes and professional organizations has worked with NIST to establish a comprehensive program to identify and address high priority national needs for building safety. Key areas include increased structural integrity, standards for first-responder equipment, enhanced fire resistance of structures, building operations in emergencies, and improved emergency egress and access. NIST will expand support for this effort, developing the technical basis for needed improvements in practice, standards, and codes for buildings and for guidelines and equipment standards for first responders. The Institute will develop simulation and decision-support tools and technical guidelines, conduct trial designs to demonstrate the effectiveness of technical solutions, and recommend specific proposals for needed changes to codes and standards.
- **Biometrics (\$1 million).** Biometrics – positive identification of individuals based on physical characteristics – is a critical tool in the war on terrorism. As terrorist and criminal databases become larger and larger, it is more and more important that biometric technologies perform accurately and quickly. As this dynamic technology continues to evolve, the field must be constantly reassessed to ensure that the government is using the most accurate biometric recognition technology available for a given application. NIST will build on its existing expertise in biometrics to certify facial recognition technologies to make certain that all requirements for border security are met, build on its testing program for determining the accuracy of new multi-modal biometric systems (those combining two or more biometric techniques), and develop tests and guidelines to ensure that future biometric systems are interoperable and work efficiently in real-world applications.

### **New Measurement Horizons for the U.S. Economy and Science (\$17.2 million increase)**

One of the most serious challenges NIST faces in its mission to provide the measurement infrastructure needed by the Nation’s scientific and industrial communities is the requirement for the relatively small Institute to stay not only abreast of but — in many cases — ahead of rapidly changing developments across the broad range of science and technology.

- **Biosystems and health (\$7,195,000).** The advances in biology and biotechnology in the last few years – both new understanding in fields like genomics and proteomics and new capabilities and technologies such as gene engineering and microarrays – constitute a

technological revolution in fields as diverse as material science, agriculture and healthcare. A lack of measurement tools for ensuring accuracy and reliability looms as a major roadblock that could prevent promising biotechnologies from achieving their potential for mainstream health care applications.

NIST has a unique, multidisciplinary expertise in measurement science that is essential in a field like biotechnology, which lies at the interface of biology, chemistry, physics and mathematics. The Institute also has a long history of working with the healthcare industry to provide needed measurement technologies and reference standards ranging from clinical standards for cholesterol and glucose to DNA. Under this initiative, NIST will establish a systems approach to identifying and removing measurement-related barriers to the effective application of biotechnology in healthcare. The Institute also will further the development of bioinformatics – the computational and information science tools needed to assemble, organize, summarize and analyze the mountains of biological data produced by these new technologies.

- **Interoperability and security for emerging scientific systems (\$2 million).**

Sophisticated scientific information systems are critical to the continued competitive advantage of the United States. The systems that underlie the Nation’s research advances in science and engineering – the “cyberinfrastructure” – are rapidly expanding in all directions. Individual information devices – from radio-frequency ID (RFID) tags to “smart dust” to micro-electro-mechanical systems (MEMS) – are becoming ever smaller, more capable, and more ubiquitous. At the other end of the scale, system complexity – systems of systems of systems – is growing rapidly as well. It is crucial that standards and measurements for reliability, manageability, interoperability and security be included from the beginning of system design to avoid costly retrofits.

As part of this initiative, NIST will develop the technical support tools required to maximize the performance of future components, systems and networks, including developing metrics and standards for the performance, conformance and usability of complex, multi-modal, distributed scientific systems to ensure interoperability. NIST will also develop metrics and techniques for characterizing and assessing emerging self-managing system technologies, and develop mathematical models, measurement techniques and control systems capable of detecting and reacting to emergent behaviors in very-large-scale scientific systems. The initiative also calls for NIST to develop test methods and protocols for detecting and reporting malicious tampering of systems and components.

- **Quantum processing – beyond high-end computing (\$4 million).** Quantum information science, which seeks to exploit the peculiar characteristics of quantum mechanics to create information processing systems of almost unimaginable power, is likely to revolutionize science and technology on a scale comparable to the introduction of the laser, the integrated circuit, and the computer. Currently intractable problems, such as the factoring of very large numbers to decipher terrorist communications, potentially could be done in less than a second by a quantum computer. On the other hand, quantum cryptography could provide perfectly secure defense communications.

NIST is a leader in fundamental research on quantum information systems, having demonstrated laboratory-scale quantum computing and quantum teleportation systems. There is also a need for a significantly broader program to provide the basic measurement tools and standards for quantum computing and communications systems to support U.S. industry's research and development of quantum systems. Quantum computing also will require the development of whole new approaches to processor and memory control, error management, and component interconnections. Under this initiative, NIST will develop a measurement infrastructure and the fundamental technologies needed to build prototype quantum processors that could be scaled up to true quantum computers, and develop metrics for evaluating alternative computing architectures based on quantum processing.

- **Building competence for advanced measurements (\$4 million).** Since the late 1970s, a key element of NIST's planning strategy has been the Building Competence for Advanced Measurements Program, a special research effort enabling NIST to explore key developing areas of science and technology and establish a base of technical expertise on which to build future measurement services. The quantum physics research of NIST's two Nobel laureates, the development of new cold neutron instrumentation that ultimately led to the Institute's unique Cold Neutron Research Facility, and NIST's Biotechnology Division with its pathbreaking research in DNA forensics all were fostered originally by Competence Program funding. The Competence Program is an essential tool giving NIST's research program the necessary agility to adapt to fast-moving scientific developments. The proposed initiative will allow NIST to expand and enhance the existing Competence Program.

#### **Facilities Improvement Plan (\$32 million increase)**

NIST is engaged in a long-range facility modernization program to make badly needed repairs and upgrades to its physical plant. NIST maintains about 50 specialized laboratories, offices and support buildings at its two major campuses in Gaithersburg, Maryland and Boulder, Colorado. Most of the Gaithersburg structures were built in the 1960s and the Boulder site is a decade older. The aging of these facilities has become a serious impediment to the Institute's mission, hampering not only NIST work on the research frontiers of biotechnology, nanotechnology, and semiconductor technology, but even routine activities such as the calibration of precision pressure gauges used to ensure the accuracy of airplane altimeters and other industrial pressure systems. NIST developed a long-range Facilities Improvement Plan, as well as plans for the thorough renovation of existing structures and a maintenance program designed to address long-term maintenance needs and reduce an extensive backlog of needed maintenance work.

#### **Maintenance for the Advanced Measurement Laboratory (\$3.4 million increase)**

Completed at the end of 2003, the NIST Advanced Measurement Laboratory (AML) is one of the world's most sophisticated measurement and standards laboratories. Specialized AML labs are able to control environmental factors such as vibration, temperature, humidity, and surface and air cleanliness to the demands of NIST's most advanced research in areas. In some labs, for example, temperature can be controlled to within one-hundredth of a degree Celsius across the entire room.



Maintaining and operating the AML poses special challenges because of the sophisticated and complex mechanical and electrical systems needed to maintain the rigorous environmental controls. Thorough and uncompromising preventive maintenance is required to keep the AML operating as designed and protect the Nation's investment in this unique laboratory. If the clean room mechanical systems ever slip from their exacting design parameters, for example, it will likely cost over \$100,000 to decontaminate the clean room and return it to service. This initiative covers the needed increase to NIST's research facilities budget to maintain the AML.

**Baldrige National Quality Program (\$5.7 million request)**

NIST also administers the Baldrige National Quality Program (BNQP). Created by the Congress in 1987, the BNQP has established a standard for performance excellence that helps U.S. businesses and other organizations continuously improve their competitiveness and productivity through rigorous quality and performance management practices.

Only a relative handful of institutions have won the program's centerpiece, the Malcolm Baldrige National Quality Award – since 1988, only 62 Baldrige Awards have been presented to 59 organizations. Nonetheless, the BNQP has had a pervasive influence on U.S. industry, schools and hospitals through the widespread dissemination of Baldrige “best practices.” Many thousands of organizations use the Baldrige criteria internally to assess and improve their performance, deliver greater value to their customers, and improve overall organizational effectiveness. The BNQP has been copied widely by state governments and other countries.

The Baldrige Award originally had categories for manufacturing, service, and small business. In 1999, the award was expanded to include categories in education and health care. In 2004, the award was expanded to include all non-profit organizations, including Federal, state and local government organizations.

**Hollings Manufacturing Extension Partnership (\$46.8 million request)**

Since 1988, the Hollings Manufacturing Extension Partnership (HMEP) at NIST has fostered a Federal-state-local partnership program to give small and medium sized manufacturers a nationwide network of not-for-profit centers to help them become more competitive and productive. HMEP centers serve all 50 States and Puerto Rico, promoting lean manufacturing techniques such as zero-defect quality programs, and helping even the smallest firms tap into specialists from across the country with manufacturing and business expertise in plant operations and on manufacturing floors. The FY 2006 budget request will fund the program at \$46.8 million. At this level, the Administration will maintain a national network of centers, while focusing funding based on a center's performance and need.

**Advanced Technology Program (\$0 request)**

Since 1990, the Advanced Technology Program has used cost-shared awards to encourage industry investment in high-risk, innovative technology R&D that promise broad benefits to the Nation. While the program has sponsored successful research projects over the years, this budget proposes terminating the program in favor of more appropriate and higher-priority needs of government funding. Our budget request reflects our belief that the NIST core laboratory

programs have a much higher priority than the ATP because they support the fundamental science and technology needs of U.S. businesses, workers and the U.S. economy.

### **National Oceanic and Atmospheric Administration Programs**

Americans look to NOAA for an incredible variety of services and support ranging from the local weather forecast, to a sustainable supply of quality seafood, to the safe transport of millions of tons of weatherborne cargo. NOAA also helps to keep the coastline safe and vibrant, and to maintain detailed research on the climate from the frozen arctic to the depths of the oceans. NOAA's Strategic Plan highlights focal areas for research under each of the agency's four major cross-cutting strategic goals: ecosystems, climate, weather and water, and commerce and transportation. NOAA's FY 2006 budget request includes several initiatives that are research driven or science based which are set out below in the context of NOAA's four major strategic goals. I would like to begin by highlighting the Global Earth Observation System of Systems (GEOSS), a program that brings together elements of all four strategic goals.

#### **Global Earth Observations (\$94.7 million increase)**

NOAA's FY 2006 budget includes increases of approximately \$94.7 million to support requirements to build an integrated Earth observing system, the GEOSS. Included in these efforts is the \$65.6 million requested for NOAA's Geostationary and Polar Orbiting Satellites, and the \$9.5 million to expand the U.S. Tsunami Warning Network. The new 'system of systems' will "take the pulse of the planet" by providing critical scientific data needed to address important global economic, social and scientific challenges. With this improved knowledge, decision-makers around the world will be able to make more informed decisions regarding climate, the environment, and a host of other economic and social issues that are affected by Earth's systems.

#### **Ecosystems (\$74.52 million increase)**

DOC requests an increase of \$1.5 million to improve the condition of coral reefs through support and implementation of locally driven three-year action strategies in order to translate the broad national goals proposed by the U.S. Commission on Ocean Policy into action. The strategies are roadmaps for collaborative and cooperative action among federal, state or territory and nongovernmental partners to address specific threats to coral reef ecosystems, including land-based sources of pollution, recreational overuse, lack of public awareness, climate change, coral bleaching, disease, and issues addressed by fisheries management, such as over-fishing.

DOC requests a net increase of \$5.5 million for economic and social science research to expand the agency's data collection capabilities. This is critically important in the area of fishery management. With the funds requested, NOAA expects to 1) complete economic analyses on commercial harvesters for 26 Fisheries Management Plans (FMP) by FY 2006—a 46% increase over FY 2005 projections; 2) complete profiles on 20 fishing communities—a threefold increase from FY 2005; and 3) estimate economic impacts on recreational and commercial fisheries that are economically displaced in 20 federal marine managed areas—also a threefold increase from FY 2005. DOC also requests \$32.5 million for a fourth Fisheries Survey Vessel (FSV 4) that will deploy state-of-the-art acoustic technologies to enhance our ability to collect fish stocks data to protect marine mammals.

DOC requests \$61.2 million to sustain the operations of the National Sea Grant College Program in FY 2006 to continue development of a system of regional networks to organize multi-state responses to regional/ecosystem-level problems.

DOC is also requesting level funding of \$22.7 million to sustain the operations of the Ocean Exploration Program. This program seeks to increase our national understanding of unknown or poorly known ocean systems and processes by conducting 25-30 expeditions per year. In FY 2005, the program will purchase a remotely operated vehicle (ROV) and other infrastructure for NOAA's first designated exploration vessel, which is scheduled for sea trials in 2007. With this infrastructure in place, NOAA will be able to devote funding to support an expanded set of expeditions and projects.

DOC also requests an increase of \$2.5 million for the Aquatic Invasive Species (AIS) Program. Zebra mussels have cost the Great Lakes region \$3 billion over the past decade, and they are just one of hundreds of invasive species threatening the health of the Great Lakes ecosystem.

DOC requests an increase of \$1.6 million for its Marine Aquaculture Program. This increase will spur environmentally safe domestic marine aquaculture production, and help to offset the current \$7 billion annual U.S. trade deficit in seafood; will help in rebuilding wild fisheries stocks; and will enhance job creation in both the production and processing of fishery products, thereby revitalizing communities devastated by collapsing fisheries industries.

#### **Climate (\$36.8 million increase)**

DOC is requesting additional funds for its climate programs, including an \$18 million increase to support the President's Climate Change Science Plan. This includes the following initiatives:

- an increase of \$3.2 million to conduct further research on the Tropical Atmosphere Ocean (TAO) array of buoys and the Pilot Research Moored Array of buoys in the Tropical Atlantic (PIRATA). This funding will expand the TAO array into the Indian Ocean and support the technological development of the next generation of moored buoys.
- \$2 million to develop new climate reanalysis datasets that will enable us to explain more adequately the causes of observed climate variability and change. These datasets will substantially reduce current uncertainty about historical climate variations and improve our ability to analyze and detect interannual-to-decadal variability and weather-climate trends for the 20th century.
- an increase of \$800,000 for the Regional Integrated Sciences and Assessment (RISA) program. This funding will initiate a multi-year research effort to: (1) refine existing regional integrated research and address new issues of importance to decision-making communities in regions currently served; and (2) link, in an integrated manner, climate research and information to decision-making processes in regions not currently supported by NOAA to ensure NOAA is providing effective climate services across the Nation.

- an increase of \$3.5 million to continue building and maintaining a global ocean observing system that will accurately document climate-scale changes in ocean heat, carbon and sea level. This effort will complete 55% of the ocean observing system, keeping us on track with our international commitment of completing the ocean climate observing system by 2010.
- an increase of \$2.1 million for expanded research efforts in Aerosols, Clouds, and Climate Change: Observations and Predictions. This research effort is part of a multi-year program of observations to quantify how aerosols (airborne fine particles) influence climate change by their interactions with clouds. The observations will be used to test, validate, and improve aerosol-cloud and global climate models so that they more accurately represent aerosol-cloud interactions.
- \$7.5 million to support other ongoing climate research programs in Climate Research and Observations, Climate Operations, and Climate Data and Information programs.

#### **Weather and Water (\$96.2 million increase)**

In response to the tragedy that struck Southeast Asia on December 26, 2004, the Administration on January 14, 2005, announced a plan to commit an additional \$37.5 million over the next two years to tsunami research and preparedness capabilities. NOAA's portion of the Administration proposal is \$24 million over two fiscal years: \$14.5 million in FY 2005 and \$9.5 million in FY 2006, which will be used to expand the existing six buoy Deep-ocean Assessment and Reporting of Tsunamis (DART) system that forms the Pacific Tsunami Warning Network. The new funds provide for an additional 32 DART buoys by mid-2007 – seven in the Atlantic Ocean, Caribbean Basin and Gulf of Mexico, and 25 in the Pacific Ocean. The program will also procure 38 new sea level monitoring/tide gauge stations, provide 24/7 warning coverage at the Richard H. Hagemeyer Pacific Tsunami Warning Center and the West Coast/Alaska Tsunami Warning Center, upgrade 20 seismometers used to improve tsunami detection, and expand the TsunamiReady program to improve community preparedness.

DOC also requests \$4 million to begin developing a nationwide water resources forecasting capability that is integrated and leveraged with other federal water agency activities, forming the basis of a national water information system. This initiative provides the water modeling capability to support the U.S. Commission on Ocean Policy mandate for a national water quality monitoring and prediction system. Furthermore, the initiative enables NOAA to deliver a national database of drought analyses and predictions, and generate user friendly Geographic Information Systems (GIS) products for monitoring drought. The initiative will provide water users the ability to assess water availability in real time and make informed decisions to mitigate impacts of extreme water events, such as droughts.

DOC also requests \$2.1 million to accelerate nationwide implementation of ozone air quality (AQ) forecasting capability from FY 2009 to FY 2008 and to deliver an initial particulate matter forecasting capability by FY 2011. The effect of poor air quality on the national economy is estimated at \$150 billion/year from health effects alone. Accurate air quality forecast guidance, provided in time to take action, can realize significant savings. Due to the magnitude of this

impact, even a 0.5% change due to air quality forecasting would have a significant effect, saving about \$750 million a year nationally.

### **Commerce and Transportation (\$35.1 million increase)**

DOC requests a total of \$7.5 million to maintain the operations of the Joint Hydrographic Center, established in FY 1999 as a partnership between NOAA and the University of New Hampshire. The Center's activities focus on two major tasks: the creation of a learning center that will promote and foster the education of a new generation of hydrographers and ocean mapping scientists, and research to develop and evaluate a wide range of state-of-the-art hydrographic and ocean mapping technologies and applications.

An increase of \$900,000 is requested for the South Carolina Geodetic Survey and the California Spatial Reference Center. South Carolina's exemplary state program works to establish horizontal and vertical geodetic control throughout the State to allow land and land-related items to be referenced to the national horizontal and vertical coordinate system. The Survey's efforts improve land records management, engineering, land planning, and economic development. NOAA's support of the California Spatial Reference Center has enabled the State to develop a plan to establish and maintain an accurate state-of-the-art network of GPS control stations necessary to meet the demands of government and private businesses for a reliable spatial reference system in California. This infrastructure will aid public health and safety, assist in the protection and preservation of natural resources, and improve the productivity of government and private business.

DOC also requests \$2 million to implement the National Vertical Datum Transformation tool database, or VDatum. This tool supports NOAA's requirement for hydrographic and shoreline data for our nautical techniques. VDatum will benefit NOAA's modernization efforts in shoreline measurement and hydrographic surveying for navigation safety. In addition, the tool will enable sharing of geospatial data sets among federal/state/local agencies and academia by translating data between disparate reference datums.

### **CONCLUSION**

This completes my statement. The Department's research and development budget includes a number of investments critical to our nation. I look forward to working with you and Members of the Committee in meeting the challenge of finding the necessary funds at a time when the demands on the Federal Budget continue to increase.

Thank you for the opportunity to appear here today to present the Department's R&D budget. I would be pleased to answer any questions you may have.