

**TESTIMONY OF
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**BEFORE THE
COMMITTEE ON SCIENCE
UNITED STATES HOUSE OF REPRESENTATIVES
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Mr. Chairman and Members of the Committee, I am pleased to join you today as we examine the Administration's FY 2007 budget request for research and development at the Department of Commerce. I want to thank the Committee, especially Chairman Boehlert, for your continued support and leadership on innovation issues. You have been a constant and strong voice for the science and technology community, and I look forward to continuing our work together to ensure that America remains the world leader in the science and technology field.

INTRODUCTION

Innovation and competitiveness drive the Nation's economy. The Department of Commerce provides the tools to help maximize U.S. competitiveness and ensure the economic health of American industries, workers, and consumers.

I was pleased to play a role in the National Summit on Competitiveness that was held at the Department of Commerce on December 6, 2005. The purpose of the summit was to raise awareness about the seriousness of the global competitiveness challenge and to promote an action agenda to ensure continued U.S. leadership in innovation. Our major international competitors are committing significant resources to their scientific and technological infrastructure, and increasing their ability to compete with the United States. This has led to a growing concern among industry and academia that America should increase its response to the changing competitive landscape.

The summit involved key leaders from Government including Commerce Secretary Carlos Gutierrez, Energy Secretary Sam Bodman, Education Secretary Margaret Spellings, Labor Secretary Elaine Chao and National Science Foundation Director Arden Bement. About 50 corporate CEOs and university leaders joined with these Government officials to discuss actions necessary to strengthen America's innovation capacity, particularly in science and technology research, education, workforce development, and the deployment of new technologies.

In his State of the State of the Union address, President Bush made it clear that we are faced with a choice in responding to the increasingly global economy. We can pursue the path of isolationism or we can choose to compete with confidence. President Bush has chosen the latter path by announcing the American Competitiveness

Initiative (ACI), which will help ensure that America meets this goal and remains a leader in science and technology advances. The centerpiece of the ACI is the President's strong commitment to double over 10 years investment in key Federal agencies that support basic research programs in the physical sciences and engineering – the National Science Foundation, the Department of Energy's Office of Science, and the Department of Commerce's National Institute of Standards and Technology (NIST).

Under the ACI, NIST is slated for \$535 million for its laboratory research and facilities appropriations. This budget proposal includes a \$104.1 million increase above NIST's FY 2007 base—or more than 24 percent. If appropriated this would be the largest dollar increase ever for NIST's laboratory research.

The increase reflects the importance of the work that NIST undertakes to promote competitiveness and innovation – with the aim of improving economic security and improving the quality of life. It also reflects the importance that this Administration places on improving the environment for innovation and competitiveness. This commitment – as evidenced by the NIST budget proposal -- is extraordinary in a budget that is mindful of the need to be stringent and restrain Federal spending and reduce the deficit.

This funding will support the work of 3,900 scientists and engineers from Government, industry and universities – an increase of 600 researchers over FY 2006. Their work in areas including nanotechnology, hydrogen and quantum information will lead to the innovations of tomorrow, such as much more efficient batteries, and smaller computer chips to power our digital devices, as well as fuel cells to power pollution-free cars and unbreakable codes to protect electronic financial transactions and video transmissions.

The Department also proudly houses another extremely important science agency, the National Oceanic and Atmospheric Administration (NOAA). NOAA's mission is to understand and predict changes in the Earth's environment, as well as to conserve and manage wisely the 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 and 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, stimulate innovation and improve economic prosperity, the Department is also directing resources toward

disaster prediction and prevention, to better understand and minimize the loss of life and property from disasters.

The 2005 Atlantic hurricane season was the busiest on record and extended the current period of increased hurricane activity which began in 1995—a trend likely to continue for years to come. This season shattered records that have stood for decades—the most named storms, most hurricanes and most category five storms. Arguably, it was the most devastating hurricane season the country has experienced in modern times.

The devastation along the Gulf Coast from Hurricanes Katrina, Rita and Wilma is of historic proportions. It is catastrophic. However, without NOAA's forecasts and warnings, and its extensive recovery activities after the passage of each storm, the devastation and loss of life would have been far greater. As Chairman Ehlers himself has noted, NOAA "alone pays for itself over and over in terms of the protection it gives to people and to property."

NOAA's forecasts and warnings for the 2005 Gulf hurricanes pushed the limits of state-of-the-art hurricane prediction. Our continuous research efforts, including observations, modeling, and expanded computational resources at NOAA, and in partnership with other Federal agencies, have led to our current predictive capabilities and improved ways of describing uncertainty in prediction. But NOAA's work does not end there. NOAA assessed damage from storms, as well as the impact to the areas' fisheries. It continues to support hazardous materials containment and abatement efforts, provide necessary data critical for post-storm response and recovery operations, and assist dredging operations, allowing our nation's ports and waterways impacted by the storm to open.

NOAA's science is just as critical to our understanding and management of our oceans. In December 2004, the Administration released the *U.S. Ocean Action Plan* (Plan), in response to the U.S. Commission on Ocean Policy's report entitled, *An Ocean Blueprint for the 21st Century*. NOAA will continue to play a key role in implementing many of the Plan's ocean policy measures, including the establishment of a coordinated ocean governance structure. Chairman Ehlers has noted that "these are critical issues crucial to the survival of humans on the planet when we consider the extent and the complexity of the oceans and life on the planet." 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.

NOAA's global leadership extends to monitoring the planet through the development of the Global Earth Observation System of Systems (GEOSS). Last April, the United States released its first-ever plan to monitor the Earth. As a collaborative effort of 15 Federal agencies and three White House offices, the 10-year Strategic Plan for the U.S. Integrated Earth Observation System will, over time, benefit people and economies around the world by improving the ability to monitor, understand and predict changes to the Earth. The completion of this plan marks a significant milestone in the ongoing development of GEOSS, involving nearly 50 other countries, the European

Commission and 29 international organizations. 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 also serves as the lead coordinating agency for the U.S. Climate Change Science Program (CCSP) which integrates a broad range of climate-related observations, field studies and computer model projections sponsored by 13 Federal agencies. CCSP has a goal of substantially improved understanding of both the causes and the potential effects of climate variability and change, on time scales extending from weeks to decades. NOAA's mission also includes the implementation of climate predictive and interpretive services for a wide range of applications, thereby providing significant benefits to users in several sectors of the economy.

HIGHLIGHTS OF THE FY 2007 BUDGET REQUEST

The FY 2007 President's budget request for the Technology Administration is \$582.8 million, including \$1.5 million for the Office of the Under Secretary and \$581.3 million for NIST. TA 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 serve as advocates for technological innovation and analyze the factors that affect our competitiveness.

For NOAA, we request a total of \$3.684 billion. The request is an increase of \$345 million or 10 percent above NOAA's FY 2007 base. This FY 2007 request reflects our continuing effort to better serve the American people by restraining spending and advancing only the most mission-critical services. The NOAA staff of dedicated professionals, working with extramural researchers and our international partners, is extending our knowledge of climate change, expanding meteorological prediction capabilities, improving coastal resource management, charting more of our oceans and coasts, and enhancing environmental stewardship.

For the remainder of my testimony I would like to focus on the Department's science and technology budget priorities for the upcoming fiscal year as reflected in TA/NIST's and NOAA's requests. The Commerce Department's budget illustrates our commitment to preserve the core competencies of TA, NIST and NOAA, and to promote competitiveness, innovation and economic growth.

Technology Administration Programs

The Technology Administration and its various components – NIST, the National Technical Information Service, and the Office of the Under Secretary - seek to maximize technology's contribution to economic growth, high-wage job creation, and the social well-being of the United States.

National Institute of Standards and Technology

NIST has long been a center for high-impact basic research, as evidenced by the three Nobel Prizes that have been awarded to its scientists in the last decade. NIST research has led to innovations that we can see today, from the high-density magnetic storage technology that makes devices such as computer hard drives and mp3 players so compact, to protective body armor for law enforcement officers and diagnostic screening for cancer patients

NIST's Scientific and Technical Research and Services (\$467.0 million)

The NIST budget is divided into three appropriations, the first of which is \$467.0 million covering Scientific and Technical Research and Services (STRS). This includes \$459.4 million for NIST's *laboratory research*, which is the core of NIST's operations. Through these laboratories, NIST plays a unique role in the Nation's scientific, industrial and business communities. Scientists, engineers, health care professionals, manufacturers and business people compare and trade data, test results, manufactured goods, and commodities with greater confidence when NIST is present in the background -- anchoring the national measurement and standards system that is the language of research and commerce.

This is the oldest and one of the most important of NIST's long-standing missions. It affects every American who goes to the store, buys gasoline or pays a utility bill, because each year \$4.5 trillion in wholesale and retail trade is measured against standards that are ultimately traceable to NIST. It affects:

- every American whose job depends on the ability of our industries to innovate and to compete in global trade -- because product quality and productivity depend on the ability to measure and precisely control the production process, and because more and more high-tech and high-value products are subject to foreign regulations that require measurements traceable to internationally recognized standards;
- every American who relies on fundamental business services and communications devices -- because so many of these services depend upon NIST measurements and standards in ways that are invisible to most consumers and service sector employees; and
- every American concerned with homeland security -- because NIST is being called upon increasingly to provide the measurement assurance behind sensitive detection systems for chemical, biological, explosive or radiological weapons.

It is a vital mission, and one that is far from static, because a modern, progressive, industrialized society imposes constant demands for improvements in its measurements and its standards. The pace of America's technological innovation both drives and is driven by our ability to observe and to measure, and NIST's infrastructure is vital to accelerating that innovation.

NIST's reputation and past accomplishments are known worldwide because of its laboratory-based work, and its level of excellence is the goal for all measurement research institutions. NIST is increasingly focused on the most intriguing and challenging technologies and industries of the new century, and the measurements and standards that will be crucial if U.S. industry is to innovate, compete, and excel in the future.

The requested increases for the NIST laboratories match the President's R&D priorities and the Nation's measurements and standards needs. Discoveries and advances in nanotechnology and manufacturing supply chain integration have the potential to dramatically transform manufacturing and business industries through innovation and productivity improvements. Similarly, developments and discoveries in quantum information science, hydrogen research, and new imaging techniques for materials and medical applications will potentially improve not only the life of every American, but will also have an impact on the future of people throughout the world. The ability of U.S. companies to sell their goods and services overseas to growing global markets will depend on NIST's work to open markets for U.S. workers and exporters. The complex information systems that are crucial for our daily lives will be more secure with the assistance of NIST's computer security expertise. These are the challenges and opportunities that face the Nation and NIST in the 21st Century, challenges that NIST will be better equipped to address as a result of this budget.

The President's American Competitiveness Initiative for NIST totals \$104.1 million in enhancements for the core NIST programs including the NIST laboratories and facilities improvements. The major NIST focus of the American Competitiveness Initiative includes the following:

- ***Targeting the most strategic and rapidly developing technologies (\$45 million)***
 - Enabling Nanotechnology from Discovery to Manufacture (\$20 million),
 - Enabling the Hydrogen Economy (\$10 million),
 - Quantum Information Science: Infrastructure for 21st Century Innovation (\$9 million),
 - Innovations in Measurement Science (\$4 million), and
 - Cyber Security: Innovative Technologies for National Security (\$2 million).

- ***Increasing the capacity and capability of critical national assets (\$27 million)***
 - NIST Center for Neutron Research (NCNR) Expansion and Reliability Improvements: A National Need (\$22 million including \$10 million in STRS for instrumentation development and \$12 million in CRF for design of new guide hall), and
 - Synchrotron Measurement Science and Technology: Enabling Next Generation Materials Innovation (\$5 million).

- ***Meeting near term needs (\$12 million)***
 - Manufacturing Innovation through Supply Chain Integration (\$2 million),
 - Structural Safety in Hurricanes, Fires, and Earthquakes (\$2 million),
 - International Standards and Innovation: Opening Markets for American Workers and Exporters (\$2 million),
 - Bioimaging: A 21st Century Toolbox for Medical Technology (\$4 million), and
 - Biometrics: Identifying Friend or Foe (\$2 million).

- ***NIST facilities improvement plan (\$20.1 million)***
 - Phase I design of the renovation of the main Building 1, in Boulder, Colorado (\$6.3 million)
 - Design and limited renovation of Building 4 in Boulder, Colorado (\$3.8 million), and
 - Increasing the base for Safety, Capacity, Maintenance and Major Repairs of NIST facilities (\$10 million).

I want to emphasize and provide additional information about several of these important initiatives, to explain why the President has decided that they merit such an investment in tight budget times.

Enabling Nanotechnology from Discovery to Manufacture (+\$20 million)

Nanotechnology is anticipated to be the major breakthrough technology in the 21st century—with the nanotechnology-related market predicted to exceed \$1 trillion globally by 2015. Within the next 10 years, experts expect at least half of the newly designed advanced materials and manufacturing processes to be at the nanoscale. The United States is making significant investments in nanoscience and nanotechnology, and it is essential that we rapidly and efficiently transfer our basic scientific discoveries to practice within our manufacturing sector. Globally, no one country or region has a significant technological lead in this area—with the European Union, Japan, and other countries each investing about the same amount of government resources as the United States.

Successfully translating nanoscale discoveries into manufactured products will be critically dependent on:

- developing process technologies to efficiently and reliably produce commercially significant quantities of nanomaterials,
- developing advanced measurement and process-control technologies—including standard reference materials—to monitor production processes and for quality control, and
- close cooperation and interaction between the research sector, the manufacturing sector, and the national measurement standards system.

Enabling the Hydrogen Economy (+\$10 million)

President Bush issued a challenge to the Nation's scientists and engineers in his 2003 State of the Union speech to overcome technical obstacles so that "the first car driven by a child born today could be powered by hydrogen, and pollution-free." Hydrogen fuels are expected to reduce the environmental impact of energy use as well as lower dependence on foreign energy sources. NIST has the technical expertise, unique facilities, and the mandate from Congress needed to make substantial contributions toward a robust hydrogen economy.

For the past 50 years, NIST has been a leading provider of data on the chemical and physical properties of hydrogen. NIST's Center for Neutron Research (NCNR) is a premier facility for the study of hydrogen. The NCNR already is being used in conjunction with major U.S. manufacturers to study the flow of hydrogen through operating fuel cells to help improve the efficiency and durability of these devices. NIST is, in fact, the lead agency for weights and measures for vehicle fuels and will need to develop physical reference standards, calibration services, and new consensus standards to help ensure equitable trade of hydrogen in the marketplace. The safe handling, production, and distribution of hydrogen presents significant challenges -- which is why Congress has charged NIST with helping to develop standards for pipeline safety and reliability. NIST's expertise in building and fire research will be essential for developing model building codes that foster adoption of hydrogen technologies in local communities.

Moreover, NIST's expertise in manufacturing will be critical for advancing hydrogen process control technologies and the design of fuel cells that can be manufactured cost-effectively. That is why the President is requesting additional funding for NIST's laboratory work in this area as part of the effort to achieve the vision of a hydrogen economy.

Quantum Information Science: Infrastructure for 21st-Century Innovation (+\$9 million)

America's future prosperity and economic security may rely in part on the exotic properties of some of the smallest particles in nature to accomplish feats in physics, information science, and mathematics that are impossible with today's technology.

Research in quantum information seeks to control and use these properties for scientific and societal benefits. Researchers are working toward quantum computers that can solve problems in *seconds* that today's best supercomputers could not solve in *years*. Much like the way computers of today greatly improved our quality of life, quantum computers of the future will solve problems beyond our current imagination. We do know that they will create unbreakable codes to protect commercial communications, including financial transactions and video transmissions, but we also believe they will do much more. Advances in quantum information science have the potential to expand and

strengthen the U.S. economy and security in the 21st century just as transistors and lasers did in the last century.

NIST is a leader in quantum research with several world-renowned scientists, including three Nobel laureates—and it is perfectly positioned to play a more critical role in advancing the quantum realm of science and harnessing its power to achieve benefits for the economy and for our security.

Under the FY 2007 initiative proposed by the President, NIST will accelerate the field by expanding its in-house research efforts and by enhancing its effort to exploit the fundamental properties of quantum systems to develop new metrology tools and methods. Moreover, NIST will establish a Joint Quantum Institute to leverage NIST's own expertise and resources with those of a university and the National Security Agency. Specific, practical benefits will include: improved security for electronic commerce; maintenance of the U.S. lead in computing and information processing; improved accuracy for electrical and other standards based on better understanding of quantum systems; and establishment of U.S. industry as the leader in the emerging field of quantum engineering.

It takes wonderful, talented people – the best in the world – to conduct the kind of Nobel Prize-winning, McArthur Genius Award-winning, National Medal of Science-winning work that is done by NIST. It also takes facilities where this work gets done, which is one reason that the President's Budget for 2007 includes \$68 million – including a \$32.1 million program increase (including \$12 million in the NIST Center for Neutron Research initiative and \$20.1 million for the NIST Facilities Improvement Plan -- for *NIST's Construction and Research Facilities (CRF)* account.) Moreover, these investments at NIST also support industrial innovation and competitiveness by making available special research facilities used by scientists and engineers from industry, universities, and other agencies. Congress has helped NIST to tackle some of its most pressing facilities needs, resulting in two relatively new additions. The NIST campuses in Boulder, Colorado, and Gaithersburg, Maryland, are showing their age (50 and 40 years old, respectively). Additional investments are needed if these sites are to remain fully serviceable and allow the researchers that use these facilities to be as productive as possible.

The President's proposal for CRF includes resources for safety, maintenance, repair, and facilities upgrades. The CRF request would fund:

- Construction and renovations at the NIST Center for Neutron Research, tied in with the parallel R&D initiative in STRS (\$12 million).
- Increases for the NIST safety, capacity, maintenance and major repairs (SCMMR) budget to repair aging facilities (\$10 million), and
- Building renovations at the agency's Boulder, Colorado, site (\$10.1 million). This is a repeat request that we are making for these sorely needed renovations. We have been moving forward as quickly as possible to complete the needed projects.

Finally, the President is requesting \$46.3 million to fund the *Hollings Manufacturing Extension Partnership* program. This is a reduction from the FY 2006 level that would be made in order to address the Nation's most pressing funding needs in an austere fiscal environment. NIST will focus the FY 2007 funding to maintain an effective network of centers with an emphasis on activities that promote innovation and competitiveness in small manufacturers.

The FY 2006 appropriations and estimated recoveries will be sufficient to meet all existing obligations of the *Advanced Technology Program* and to phase it out. Accordingly, no FY 2007 funds are requested.

Office of the Under Secretary (\$1.5 million)

The key administrative and policy operations within the Office of the Under Secretary will be streamlined. TA will remain an effective advocate for technology within the Department of Commerce. TA, for instance, was the lead office at the Commerce Department responsible for working on the recent competitiveness summit hosted at the Department.

National Technical Information Service (fee supported)

The National Technical Information Service (NTIS), the third unit of the Technology Administration, is a repository of much of the Government's technical information that is used by the science and technical communities. NTIS maintains, sells and distributes a collection of scientific and technical information from various Federal agencies. NTIS covers its operating costs through fees for its products and services; in keeping with past practice, there is no FY 2007 appropriation request.

National Oceanic and Atmospheric Administration Programs

Americans look to NOAA for a wide 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 waterborne cargo. Our scientists and managers also help keep the coastline safe and economically vibrant, and maintain detailed research on the climate from the frozen Arctic to the depths of the oceans.

NOAA's budget proposes increases for the following high priority areas:

- Satellite Continuity (+\$124 million for GOES-R and NPOESS)
- Ecosystem Management (+\$108 million, including \$19.7 million for fisheries activities in the Gulf of Mexico and \$6 million for the Open Rivers Initiative)
- Weather and Water Information (+\$46 million, including \$12 million to complete and operate the Tsunami Warning System and \$1.4 million to operate and maintain Hurricane Buoys)

- Climate Services (+\$24 million, including \$6.5 million for High-Performance Computing and \$4 million for the National Integrated Drought Information System)
- Commerce and Transportation (+\$19.5 million, including \$10.5 million to address nautical survey backlog and \$5 million for critical mapping, charting, and data improvements)
- Improved facilities (+\$30 million)

Mission Support/People and Infrastructure

The backbone of the NOAA infrastructure is our integrated observation effort, including building state-of-the-art satellite programs. NOAA serves with NASA and OSTP as lead for the Federal Government in developing our U.S. integrated observing strategy. Our efforts include state-of-the-art satellite programs, supported by a requested increase of \$20.3 million for the tri-agency National Polar-orbiting Operational Environmental Satellite (NPOESS) program, which will replace the Polar Orbiting System (POES) program after completion of the current K-N' series of satellites.

As you are aware, the NPOESS program has encountered significant cost and schedule overruns, which are not included in the FY 2007 request. NPOESS is currently undergoing a recertification review in accordance with Nunn-McCurdy DoD regulatory requirements. This review will shape the way forward, and consequently, the Administration's future budget requirements. The Department of Defense request for NPOESS matches the NOAA request for FY 2007, as part of the shared funding arrangement.

We are also developing the next generation of geostationary satellites to maintain continuity of satellite data into the future. The FY 2007 NOAA budget requests \$113.4 million to move the GEOS-R series satellites into the acquisition and operations phase of its procurement.

Ecosystems (\$107.6 million increase)

The FY 2007 Budget request includes significant resources for NOAA's ocean and coastal programs, and fisheries and protected species activities in support of the President's *U.S. Ocean Action Plan*. NOAA's primary initiative is to advance ecosystem-based approaches to resource management. By applying innovative strategies to improve internal and external coordination and integration based on ecosystem principles, and by establishing baselines and integrated observations of ecosystem indicators, NOAA will increase the effectiveness of its many program activities intended to produce healthy and productive ecosystems that benefit society. Initiating ecosystem approaches to management requires better monitoring and characterization, and more effective integration and collaboration among NOAA programs and its external partners.

Highlights of the FY 2007 request in this area include \$19.7 million to support fisheries programs in the Gulf of Mexico. As the Gulf region rebuilds, these programs

will ensure that adequate science and management resources are available to promote sustainable fisheries. In addition, the request includes \$6 million for the Open Rivers Initiative in support of cooperative conservation. This will be a competitive grant program that utilizes a community-based model to remove obsolete river barriers in coastal states. NOAA will also extend its Habitat Restoration Program to the Great Lakes, expand dedicated fishery access privilege programs, improve regional collaboration and planning of coastal state managers to improve management of coastal watersheds and marine resource areas, and enhance observing and information delivery systems to inform the public as part of the U.S. Integrated Ocean Observing System (IOOS). These increases allow NOAA to meet our responsibilities as stewards of living marine resources for the benefit of the Nation, through science-based conservation and management and the protection of ecosystem health.

Climate (\$24.1 million increase)

NOAA requests \$24.1 million increase (for a total of \$230 million) for programs and activities increasing our ability to predict and assess current and future impacts of climate events such as droughts, floods, and trends in extreme climate events. These programs provide vital information for farmers, utilities, land managers, weather risk industry, fisheries resource managers, and other customers to make better decisions. One such investment will enable NOAA to continue building the global component of the Integrated Earth Observing System. Advancing observing systems toward global coverage will allow NOAA to better understand the state of the climate system and improve climate predictions. Another key investment is the request for \$4.0 million to go towards drought impact research for the National Integrated Drought Information System (NIDIS), which will aid decision makers faced with drought and water resource management issues. The request also includes \$7 million to establish the capacity to produce consistent and continually updated climate analysis data, deliver regular and systematic explanations of the state of the climate system, and advance understanding and predictions of climate extremes.

NOAA's FY 2007 Budget request includes an increase for Data Centers and Information Services, which provide access to the world's largest collection of data, including climate data, to more than 50,000 users per year. The request also includes an increase of \$6.5 million for high-performance computing and communication, which will allow NOAA to use advanced computing power to forecast the Nation's weather and climate, to model ecosystems and the ocean, to and disseminate environmental information.

Weather and Water (\$46.1 million increase)

The FY 2007 budget includes \$46.1 million in increases to sustain and improve weather forecasts and warnings. NOAA's weather and water services make a tremendous contribution to the Nation's health and economic vitality. For instance, weather warnings protect the public from extreme environmental events while forecasts are essential to weather- and climate-sensitive industries, which account for one-third of

the Nation's GDP. As an example of the benefits, during a typical hurricane season NOAA's efforts save the Nation \$3 billion. Annually, drought costs the Nation \$6 to 8 billion, and floods cost \$5 billion and cause more than 80 deaths. There are estimates that indicate that the United States can reap a 12-to-1 return annually for every dollar invested in better water resource forecasting.

Support of the FY 2007 budget request will strengthen NOAA's ability to sustain critical services and to provide crucial enhanced services. Warning improvements include \$12.4 million to operate the U.S. Tsunami Warning System and expand its scope from the Pacific to the Atlantic and Caribbean. We will use \$2.5 million to provide critical infrastructure protection for the National Weather Service Telecommunications Gateway (NWSTG). Funds will be used to implement a telecommunications network solution which resolves an existing single-point-of-failure issue associated with the commercial service provider to the NWSTG. This network solution will ensure uninterrupted delivery of critical meteorological data necessary for the protection of life and property. The budget request includes \$3.5 million to support the Wind Profiler Network, which will fund engineering design and award a development contract for new frequency compliant transmitters, develop contingency plans in coordination with data users for the loss of Profiler data in the case of potential search and rescue satellite (SARSAT) interference, and provide operations and maintenance for the current Wind Profiler Network.

Commerce and Transportation (\$19.5 million increase)

The U.S. economy relies upon an intermodal transportation network of ship, rail, highway, and air transport to move people, cargo and commerce to, from and across the Nation. This movement is heavily dependent upon the information and services that NOAA provides – weather and ice forecasts, real-time and forecast water level conditions and obstruction surveys, navigational charts, hazardous materials response, and satellite search and rescue. From 1990 to 2003, the value of U.S. international merchandise trade increased an average 6 percent annually, from \$889 billion to about \$2 trillion (in current dollars). The U.S. Marine Transportation System (MTS) carried 95 percent of this trade by volume and 41 percent by value in 2003, more than any other transportation mode. The Nation also loses at least \$4 billion annually due to economic inefficiencies resulting from weather-related air-traffic delays, and the injuries, loss of life, and property damage from surface weather-related crashes cost an average of \$42 billion annually. NOAA's products and services help maintain the efficient flow of transportation and commerce.

Among our Commerce and Transportation programs, we are requesting \$2.0 million to continue implementation of the National Vertical Datum Transformation Tool database, or VDATUM. VDATUM allows Federal, state, and local government agencies to share geospatial data more effectively and benefits NOAA's modernization efforts. The FY 2007 budget request also includes \$1.9 million to continue NOAA's efforts to provide Electronic Navigational Charts (ENCs). Sustained funding at this level will enable NOAA to cover all U.S. waters by 2010. In addition, \$2.7 million is requested for tide and current data; \$2.0 million of these funds will be used to rebuild and strengthen

the National Water Level Observation Network's (NWLON) ability to provide navigation and storm tide information throughout extreme weather and water events such as hurricanes. Several stations were damaged or destroyed during the 2005 hurricane season. Lastly, \$1.2 million is requested for Aviation Weather, which will fund procurement and fielding of 75 additional water vapor sensors as part of an Integrated Upper Air Observing System to continue to improve U.S. aviation safety and economic efficiencies. Water vapor information is critical to depicting weather hazards and reducing forecast errors. The remaining \$0.7 million will enable NOAA to maintain the existing 13 PORTS[®] as well as continue expanding the program for the next several years.

CONCLUSION

We are pleased that the President's Budget reflects the important work of the science agencies housed in the Department of Commerce. The Department's research and development budget includes a number of investments critical to our nation. Thank you for the opportunity to appear here today. I welcome any questions that you may have.