Climate Change Research and Scientific Integrity
Wednesday, February 7, 2007

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TESTIMONY OF
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*PREVIOUSLY (APRIL 2, 2002 – MARCH 30, 2006):

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U.S. DEPARTMENT OF COMMERCE;

DEPUTY ADMINISTRATOR OF THE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION; AND

DIRECTOR, U.S. CLIMATE CHANGE SCIENCE PROGRAM

BEFORE THE
COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION
UNITED STATES SENATE

FULL COMMITTEE HEARING ON
CLIMATE CHANGE RESEARCH AND SCIENTIFIC INTEGRITY

FEBRUARY 7, 2007
10:00 AM

ROOM 253
RUSSELL SENATE OFFICE BUILDING
WASHINGTON, DC

Chairman Inouye, Co-Chairman Stevens and members of the committee: thank you for your invitation to address the committee today on the important issue of assuring integrity in climate change research. I am James R. Mahoney, and I currently serve as an environmental consultant, providing scientific and professional advice to a number of organizations. From April 2, 2002 to March 30, 2006 I was Assistant Secretary of Commerce for Oceans and Atmosphere, and Deputy Administrator of the National Oceanic and Atmospheric Organization (NOAA). During this period I was also the Director of the U.S. Climate Change Science Program (CCSP), involving 13 federal agencies conducting and overseeing total annual budgets of approximately $2 billion dedicated to scientific research, earth system observations, computer simulations of future climate conditions, and evaluation of possible adaptation and mitigation actions to address climate change. I reluctantly retired from my federal appointment approximately ten months ago because of continuing significant health problems.

In 1966 I received the Ph.D. degree in meteorology from MIT, with a specialization in geophysical fluid mechanics. Since that time I have had over 40 years continuous experience in science-based environmental management, including service on the faculty of Harvard University, advisory assignments with national government agencies and international organizations in several regions of the world, extensive private sector environmental assessment and design work, and two appointed positions with the U.S. federal government (involving overall management of national acid rain studies from 1988 to 1991, and climate science studies from 2002 to 2006). A resume summarizing my experience is in Attachment 1 to this testimony.

In response to the issues raised in Chairman Inouye's letter, my testimony today addresses three main topics: (1) the background and evolution of NOAA's communication policy related to scientific research; (2) the peer

review process required for scientific reports or conclusions to be officially released by NOAA; and (3) other important and relevant items. Related to this final topic, I address the scientific and general public review process required for scientific reports and conclusions being released by the Climate Change Science Program. These CCSP processes are highly important for assuring the credibility of complicated and often controversial climate science findings that, in turn, underpin the development of appropriate climate change policies that will be needed in the years and decades ahead to address regional, national and international scale challenges.

I appear today in somewhat of a "hybrid position". In the case of positions developed and actions taken during the recent four years (ending on March 31, 2006) while I served in my federal appointed assignments, I attempt to speak from the perspective of my former position, and to convey the requested information based upon my memory and personal files, augmented by recent dialog with a limited number of my former colleagues. In the case of the broader issue of scientific integrity involved in the reporting of controversial environmental research, I also rely on the experience and judgement I have developed during more than 40 years of environmental study. As an example, I benefited from the development of a large body of "lessons learned" during my years as Director of the interagency National Acid Precipitation Assessment Program, from 1988 to 1991. Many lessons developed in the process of applying acid rain research findings to federal legislation (for example, to the Clean Air Act Amendments of 1990) positively influenced my commitment to highly transparent and inclusively reviewed scientific statements related to climate change.

The background and evolution of NOAA's communication policy related to scientific research.

As one of the principal scientific agencies within the federal government noaa has long had a well-recognized culture aimed at fostering integrity in its scientific communications activities. I suggest for the Committee's interest a working definition for "communications activities" to include (1) scientific synthesis documents (often co-authored by multiple experts) intended to summarize the best available "state of the science" in defined areas of coverage; (2) peer reviewed research papers appearing in recognized scientific journals; (3) verbal (and often written) scientific papers presented at scheduled scientific meetings; (4) books, monographs and/or sections of books intended to summarize science in designated subject areas; (5) program and project report documents that provide examples (but not exhaustive summaries) of interesting developments in the areas studied; and (6) informal presentations to students, community groups, etc.

This list of six categories is ranked in the order of decreasing requirements (in my view) for thorough and formal review before dissemination. Examples of Category 1 include the Synthesis and Assessment Reports (SAR's) being prepared by the federal government sponsored Climate Change Science Program (discussed further below), and the several volumes of the United Nations sponsored Fourth Assessment Report (FAR) being prepared by the Intergovernmental Panel on Climate Change (IPCC) that released last week its new Summary for Policymakers for the Working Group I (Physical Science findings). Both the CCSP and the IPCC documents are being prepared following well-established protocols to assure comprehensiveness, transparency and broad review by interested constituencies.

In the case of NOAA's scientific communications (including all six categories mentioned above) it is important to note that thousands of NOAA scientists produce several thousand scientific communications each year. Even in the category of media inquires NOAA typically receives twenty to fifty press inquiries each workday. The normal scientific culture of carefully reporting the findings of studies has served NOAA and other federal scientific agencies well for many years - in most cases. My observation is that – in all large work forces - there will always be some small percentage of errors in communication. Many of these errors are inadvertent, and can usually be rectified quickly. My personal observation is that there are occasional "intended errors" or misrepresentations that can occur within any organization and that illustrate the need for effective communications policies applicable to government scientific organizations. These situations can arise from two causes: (1) a scientist may desire to claim disproportionate credit for his/her work or (2) the bias of a scientist (or a group of scientists) may lead to inaccurate reporting or discussion of findings.

NOAA's communication policy over several years has aimed to reduce or eliminate errors and misrepresentations by (1) assuring appropriate internal scientific reviews before technical information is communicated; (2) asking scientists to coordinate their communication activities with the public affairs offices in the major elements of NOAA (to avoid "left hand – right hand" inconsistencies among various researchers). Please note that the internal scientific reviews mentioned here are to be conducted by scientific peers, and not by political appointees.

During recent years some scientific issues (climate change in particular) have become very controversial among elements of the public, and this has created increased challenges to the integrity of scientific reporting by NOAA and other agencies. In this situation of heightened sensitivity some NOAA scientists have complained about alleged "muzzling" of their ability to speak to the media. In particular, NOAA's long-term practice of using its public affairs specialists to seek consistency among the reports by various scientists has been seen as an impediment to full reporting. NOAA has been taking several steps to address this concern since it has arisen. In particular, NOAA Undersecretary Lautenbacher has written to all NOAA employees twice during the past year affirming his support for open reporting by all NOAA scientists. Moreover I understand that the Department of Commerce (DOC) has been revising its communications policy to encourage, but not require, scientists to work with their counterparts in Public Affairs prior to dissemination. I understand that this revised policy should be ready for adoption within the next few weeks. It is my view that this revised policy should resolve most or all of the recent complaints by some NOAA scientists, and I am sure that if any further issues arise, they will be

addressed promptly by NOAA management.

The peer review process required for scientific reports or conclusions to be officially released by NOAA.

In response to this question, I refer to the six categories of "communications activities" that I previously recommended for consideration. Not all of these categories represent "official releases" by NOAA, so it is important to recognize the differences between the categories. Table 1 on the next page addresses each category.

As Table 1 illustrates, the scientific synthesis and assessment reports (for example, the 21 CCSP Synthesis and Assessment Reports) represent an example of the most stringent requirements for peer review, including the opportunity for comments by interested public constituencies as well as by members of the scientific community. The IPCC Fourth Assessment Report documents (such as the physical science Summary for Policy Makers released last week) are similar examples. A large number of NOAA scientists, as well as many U.S. Government scientists from other agencies took part in the preparation of the new IPCC document. Dr. Susan Solomon of the NOAA Boulder Laboratories served as the overall co-chairman of IPCC Working Group I, providing substantial leadership to this major international activity.

TABLE 1. CLASSIFICATION OF CATEGORIES OF SCIENTIFIC INFORMATION COMMUNICATION SUGGESTED TO THE
SENATE COMMITTEE BY JAMES R. MAHONEY.
(These classifications are not used in the NOAA Communication Policy.)

CATE-GORY	TOPIC	OFFICIAL RELEASE?	COMMENTS
1	Scientific synthesis documents	Yes	Requires extensive peer and public review
2	Peer reviewed research papers	Case-by-case determination	Peer review accomplished by the publishing journal and by NOAA
3	Papers presented at meetings	Usually not	Peer review by NOAA scientific staff
4	Books & monographs	Case-by-case determination	Peer review by NOAA scientific staff
5	Program & project report documents	Yes	Peer review by NOAA scientific staff & project management
6	Lectures to students & other groups	No	Peer review by NOAA scientific staff is encouraged

As the table illustrates, other communications activities routinely undertaken by NOAA scientific staff typically have differing requirements for peer review. All of the first five categories require at least peer review by other NOAA scientific staff (*i.e.*, independent review by expert staff not involved in the drafting of the information) before dissemination or other use of the information. The sixth category (informal lectures to students and other community groups) does not require peer review in all cases because the information conveyed in such lectures usually would not constitute an official dissemination by NOAA.

I recommend that the committee keep in mind the six-part table presented here, or a similar classification scheme, when considering the manner in which NOAA (and possibly other federal science agencies) conveys technical information to the scientific community, to students, and to interested constituencies among the general public.

The scientific and general review process of the CCSP scientific synthesis and assessment products.

In June 2001 the President called for an increase in federal funding for climate research and observations, as part of his overall plan (also including control technology development and major new international technical collaboration) to address climate change issues. A major part of the reasoning for increased climate research was the need to improve the accuracy of regional and global scale understanding of climate variability, and to improve projections of future climate conditions related to profiles of future greenhouse gas emission rates around the world. In February 2002 the President created a new, cabinet-level interagency management

structure to supervise the approximately $2 billion annual federal expenditure in climate research and monitoring. After confirmation by the Senate in late March 2002, I undertook my new position as CCSP Director on April 2, 2002. The earliest focus for the new CCSP management structure was the creation of a Strategic Plan that would assure the development and dissemination of the best available scientific syntheses of high priority climate issues

The CCSP Strategic Plan, which has guided both scientific reporting and the development of improved assessment methodologies, was adopted in July 2003 after extensive peer review, public review and special review by an *ad hoc* committee of the National Academy of Sciences convened at the request of CCSP. The National Academy conducted a second round review of the newly revised CCSP Strategic Plan in late 2003, and reported its finding that the Plan constituted a good vehicle to guide the development of the nation's climate studies throughout the next decade.

The CCSP Strategic Plan required the development of detailed, aggressive plans for scientific peer review, and comprehensive public review, of the scientific synthesis and assessment reports by CCSP. The review process was complicated by the passage of the Information Quality Act of 2002 and the adoption of separate guidelines to comply with the Act by OMB between 2003 and 2005. In 2005 CCSP published its *Guidelines for Producing CCSP Synthesis and Assessment Products*, incorporating the combined requirements of the CCSP Strategic Plan and the OMB Guidelines responsive to the 2002 Information Quality Act. The detailed guidelines for the CCSP products are available on the CCSP web site **www.climatescience.gov**, and are being used as the basis for extensive peer and public review of the entire set of 21 CCSP Synthesis and Assessment Reports currently being prepared. These guidelines represent one of the most comprehensive summaries of guidance for the preparation and review of important government science documents. I commend these guidelines to the Committee and its staff, both to evaluate the approach to scientific dissemination adopted by CCSP, and to provide examples that may be useful for other government science reporting as well.

Time does not allow detailed discussion of these CCSP guidelines, but I note the summary statement of principles for the guidelines for the interest of the Committee. These general principles are:

- Analyses structured around specific questions.
- Early and continuing involvement of stakeholders.
- Explicit treatment of uncertainties.
- Transparent public review of analysis questions, methods and draft results.
- Adoption of a "lessons learned" approach, building upon the ongoing CCSP analyses.

I cite one example of the major progress attained by the CCSP collaborating agencies during the past few years, by reference to the IPCC Fourth Assessment science summary released last week: When the prior IPCC Third Assessment was released in late 2000, the large computer models used for the future projections of global climate conditions were supplied by Canadian and European research institutes, because the U.S. climate modeling capability was not ready for use in these global studies. In the new 2007 IPCC assessment, my view (shared by many in the field) is that the United States has assumed the leadership position in the critically important computer modeling of future climate conditions for the global climate science community.

To the Co-Chairmen and Members of the Committee, I thank you for your invitation to appear before the Committee today. I shall be pleased to answer any questions you choose to pose.

ATTACHMENT 1.

RESUME

James R. Mahoney

Education

LeMoyne College, Syracuse, NY: B.S., Physics, *Magna cum Laude*, 1959

MIT, Cambridge, MA: Ph.D., Meteorology, 1966

Professional Experience

2002 – 2006 (March): Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy Administrator of the National Oceanic and Atmospheric Administration (NOAA). Also served throughout this period as Director of the U.S. Climate Change Science Program, involving the combined work of 13 federal agencies with an annual program budget of approximately $2 billion.

1999 – 2002 (March): Environmental management consultant serving U.S. and international clients. Topics included insurance recovery for environmental damages, and technical analysis of regional air quality and haze

patterns.

1991 – 1999 (July): Senior Vice President of International Technology Corporation, a $1+ billion international engineering and construction company pursuing a broad technical specialty environmental business, combined with field construction activity dealing with restoration of contaminated soil and ground water. From 1997 to 1999 also served as President of the Consulting and Engineering Division of the corporation, responsible for a $200+ million technical business. Also from 1997 to 1999 served as Chairman of the Board and responsible corporate officer for Landbank, Inc., a wholly owned subsidiary addressing the brownfield market by restoring and redeveloping contaminated commercial property sites.

1988 – 1991 (January): Director of the National Acid Precipitation Assessment Program (NAPAP) involving six federal agencies with a combined federal budget of approximately $100 million annually. The position was in the Executive Office of the President, during the final year of the Reagan administration and during the first two years of the administration of President George H. W. Bush.

1987 – 1988 (February): Environmental management consultant serving U.S. and international clients. Topics included environmental management government organization planning for Saudi Arabia, and environmental permitting issues for large Kraft paper plants.

1984 – 1987 (February): Manager of the Environmental Industries Center of the Bechtel Group, Inc. The Environmental Industries Center addressed environmental compliance, planning and engineering matters for Bechtel's major domestic and international clients.

1983 – 1984 (January): Environmental management consultant serving U.S. and international clients. Topics included strategic planning for a large environmental engineering firm, and comparative studies of international environmental regulations.

1968 – 1983 (September): Co-founder and Senior Vice President of Environmental Research & Technology, Inc. (ERT). ERT began as a start-up in December 1968 and by the late 1970's it had grown to become the largest environmental specialty firm in the United States, with offices and laboratories located throughout the United States combined with a substantial international business operating in several countries in both the developed and developing world. Also served as President of ERT International, Inc., a wholly owned subsidiary responsible for ERT's international business from 1975 until 1983.

1966 – 1973 (June): Assistant Professor and Associate Professor (from July 1970) in the School of Public Health at Harvard University, specializing in environmental health management. During the period from December 1968 through June 1973 I served in two positions: the faculty position at Harvard and the Senior Vice President position at ERT, Inc. (see above).

1962 – 1965 (December): Graduate research assistant in the Department of Meteorology at MIT.

1959 – 1962 (June): Graduate student at MIT, supported by fellowship grants.

1956 – 1959 (June): Laboratory assistant and lecturer in the Physics Laboratories at LeMoyne College.

Honors

2006: Awarded the U.S. Department of Commerce William C. Redfield Award for outstanding public service, presented by Commerce Secretary Carlos M. Gutierrez.

2002: Confirmed by the U.S. Senate (following nomination by President George W. Bush) to be Assistant Secretary of Commerce.

1990: Elected as a Fellow of the American Meteorological Society.

1990: Awarded the U.S. Department of Commerce Gold Medal for outstanding accomplishments as Director of the National Acid Precipitation Assessment Program, presented by Commerce Secretary Robert A. Mosbacher.

1989: Elected as President of the American Meteorological Society.

1985: Selected as one of a group of four inaugural Bechtel Fellows from a worldwide population of 100,000+ Bechtel employees.

1973 – 2006 Served as member and co-chair of several committees and boards of the U.S. National Academy of Sciences

1959: Selected as a Danforth Graduate Fellow in a national competition among college seniors.

1955: Valedictorian of high school graduating class (Christian Brothers Academy of Syracuse, NY).