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Field Hearing on Soil Carbon Sequestration
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Good afternoon Senator Brownback (and members of the Subcommittee).

I am James R. Mahoney, Assistant Secretary of Commerce and Deputy Administrator of the National Oceanic and Atmospheric Administration (NOAA). I am appearing today in my capacity as Director of the United States Climate Change Science Program (CCSP). The CCSP integrates the federal research on climate and global change, as sponsored by thirteen federal agencies (the Departments of Agriculture, Commerce, Defense, Energy, Health & Human Services, the Interior, State, and Transportation; together with the Environmental Protection Agency, the National Aeronautics and Space Administration, the National Science Foundation, the Agency for International Development, and the Smithsonian Institution) and overseen by the Office of Science and Technology Policy, the Council on Environmental Quality, the National Economic Council and the Office of Management and Budget.

I am very pleased to have this opportunity to describe the Administration's scientific research program on climate and global change, with specific reference to the important role that soil carbon sequestration can play in reducing net greenhouse gas (GHG) concentrations. Climate variability often plays an important role in shaping the environment, natural resources, infrastructure, and economy. Potential human-induced changes in climate and related environmental systems, and the options proposed to adapt to or mitigate these changes, may also have substantial environmental, economic, and societal consequences. Because of the pervasiveness of the effects of climate variability and the potential consequences of human-induced climate change and response options, citizens and decision makers in public and private sector organizations need reliable and readily understood information to make informed decisions about climate issues.

President Bush's approach to addressing global climate change emphasizes science-based decision making, and recognizes that economic growth is part of the solution. A nation that grows its economy is a nation that can afford investment in research and development of new technologies. For agriculture, this investment will likely have the added benefits of increased agricultural production, improved soil quality, and increased soil carbon sequestration.

CCSP Carbon Cycle Research and Soil Carbon Sequestration

Decision makers searching for options to stabilize or mitigate concentrations of greenhouse gases in the atmosphere are faced with two broad approaches for affecting atmospheric carbon concentrations: 1) reduction of carbon emissions at their source;

and/or 2) enhanced sequestration of carbon—either through enhancement of biospheric carbon storage or through engineering solutions to capture carbon and store it in repositories. Enhancing carbon sequestration is of current interest as a near-term policy option to slow the rise in atmospheric carbon dioxide (CO_2) and provide more time to develop a new generation of low-GHG emitting technologies.

Successful carbon management strategies will require solid scientific information about the basic processes of the carbon cycle and an understanding of its long-term interactions with other components of the Earth system. Such strategies also will require an ability to account for all carbon stocks, fluxes, and changes and to distinguish the effects of human actions from those of natural system variability. Breakthrough advances in techniques to observe and model the atmospheric, terrestrial, and oceanic components of the carbon cycle have readied the scientific community for a concerted research effort to identify, characterize, quantify, and project the major regional carbon sources and sinks.

The overall goal for the CCSP carbon cycle research is to provide critical scientific information on the fate of carbon in the environment and how cycling of carbon might change in the future. Current research on the global carbon cycle is focusing on two overarching questions:

- How large and variable are the dynamic reservoirs and fluxes of carbon within the Earth system, and how might carbon cycling be managed in the future?
- What are our options for managing carbon sources and sinks to achieve an appropriate balance of risk, cost, and benefit to society?

Substantial current interest in carbon sequestration centers on land management practices that enhance the storage of carbon in soils and biomass. An example of research at the forefront of this field can be found within the Consortium for Agricultural Soils Mitigation of Greenhouse Gases (CASMGS), led by Dr. Charles Rice at Kansas State University. CASMGS is a multi-year, collaborative effort funded by the Department of Agriculture to improve the scientific basis of using land management practices to increase soil carbon sequestration, reduce GHG emissions, and provide the tools needed for policy assessment, quantification, and verification. More than 50 research and outreach projects among 10 institutions are underway focused on:

- Improving the understanding of basic processes and mechanisms controlling soil carbon sequestration and GHG emissions;
- Developing best management practices for carbon sequestration;
- Using models and databases to improve prediction and assessment of carbon sequestration and GHG emissions;
- Using measurements to evaluate the impact of management practices on soil C storage, total GHG radiative forcing, and soil NO_3 leaching.
- Developing web sites, publications, and newsletters to communicate research findings and news with policymakers, regulators, the public, and others.

I view the CASMGS program to be a highly important building block in developing the information and management tools needed to optimize the deployment of soil carbon sequestration as a key component in reducing the growth of GHG emissions in the United

States. Moreover, the CASMGS research projects can provide guidance for worldwide increased soil sequestration of carbon through the adoption of improved agricultural management practices. More details on CASMGS projects are available at *www.casmgs.colostate.edu* and *www.oznet.ksu.edu/ctec*.

Other CCSP ongoing research evaluates the important role that sequestering carbon in cropland and grazing lands can play in mitigating the potential adverse impacts of climate change. For example, current research focuses on how carbon sequestration can be optimized through management of tillage, fertilization, irrigation, drainage, and other practices. In addition, methods are being developed for rapid, accurate, and cost-effective ways to measure carbon in soil directly, and to estimate it on large geographic scales.

CCSP Management and Planning Activities

Since President Bush created the new cabinet-level management structure for climate science and technology programs in February 2002, the CCSP has made substantial progress on the program's objectives, including those related to carbon cycle research, through a variety of review and planning activities, including:

New, Integrated Management Structure: The CCSP, under the new interagency management structure that assures joint planning of approximately $1.7 billion (annual budget) climate and global change research, has (a) completed a comprehensive review of the ongoing research programs in all CCSP collaborating agencies, (b) prepared an interagency integrated climate science budget request for FY 2004, included in the President's budget request to Congress, and (c) prepared the basis for operational interagency management of the FY 2003 budgets.

Strategic Plan: The CCSP published an extensive *Discussion Draft Strategic Plan* of its new 10-year strategic plan in November 2002. A public workshop focusing on the plan was held in December 2002 and was the most highly attended and structured discussion of climate change issues held to date. CCSP will publish its updated strategic plan for the climate science program on June 25, 2003, after consideration of all of the workshop discussions and the full range of the written comments received after the workshop. The plan, which will be subject to future modification as warranted by the emergence of key science findings and key public questions to be addressed, will guide the conduct of the federal research activities, including those focused on soil carbon sequestration. All of the documentation of the CCSP strategic plan, the workshop proceedings, and the public comments appears on the web site *www.climatescience.gov.*

Comprehensive Review by the National Academy of Sciences: CCSP requested that the National Academy of Sciences – National Research Council (NRC) conduct a comprehensive review of the draft and final versions of the CCSP Strategic Plan. The Academy appointed a special 17-member committee of experts in the physical, biological, social and economic sciences that has provided preliminary public recommendations which are being considered in the update of the strategic plan. The NRC recommendations complement the input provided by experts nationwide as part of

CCSP's commitment to a highly open process of public and expert participation in the understanding of climate change issues and response strategies. The NRC report on the final Strategic Plan will be available in the fall.

Integration of Scientific and Technological Developments: One of the principal themes of the workshop was the likely need for breakthrough technology options to address the long-term challenge of global climate change. CCSP is working closely with the Climate Change Technology Program to assure that: (a) science drives the definition of technology needs, and (b) science is used to evaluate both the *intended* and the *unintended* consequences of proposed technology innovations.

Major U.S.-Led Earth Observation Summit Announced: Building on the need for a truly integrated global climate and ecosystem observing and data management system as documented in the CCSP *Discussion Draft Strategic Plan*, the United States will host an Earth Observation Summit to be held in Washington, DC, on July 31, 2003. The meeting will involve the Science Advisors and the Science or Technology Ministers of the G-8 nations and other nations, and will serve as a foundation for comprehensive observation of the Earth's climate system, which will be a focus of the December 2003 *Conference of the Parties* of the United Nations Framework Convention on Climate Change.

Closing Statement

Comprehensive, objective, transparent and well-reviewed scientific inquiry must be the core methodology used to evaluate the highly complex relationships between natural and anthropogenic influences on Earth systems, and to project potential outcomes of the many different investment and action strategies that have been proposed to mitigate or adapt to potential changes in global conditions.

While many important scientific and technological aspects of the climate change issue await improved resolution, some issues are already sufficiently resolved to compel action. In particular, soil carbon sequestration is clearly identified as a win-win strategy that deserves rapid implementation. Soil carbon sequestration provides for improved agricultural productivity and enhanced economic outcomes and assured contributions to meeting U.S. and global carbon management goals. We look to the highly important CASMGS research and outreach programs as major resources for the development and implementation of enhanced soil carbon sequestration practices in the United States and throughout the world.

Thank you very much for the opportunity to participate in this hearing.