Toward A Sustainable and Secure Water Future: A Leadership Role for the USGS

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Statement of

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Good morning, Madam Chairman and members of the Committee. My name is Roland Steiner. I am the Regional Water & Wastewater Manager at the Washington Suburban Sanitary Commission and served as a member of the Committee on Water Resource Activities at the U.S. Geological Survey of the National Research Council. The National Research Council is the operating arm of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine of the National Academies, chartered by Congress in 1863 to advise the government on matters of science and technology. Today I provide summary comments from our Committee's report, "*Toward a Sustainable and Secure Water Future: A Leadership Role for the U.S. Geological Survey*," which was just recently released. The U.S. Geological Survey requested this report and asked the committee to help them evaluate the relationship between its Water Resources Discipline (WRD) research and information collection and dissemination activities and its overall WRD agenda. We were asked to cover all of the major topical areas of WRD activities: ground water and surface water, water quality and quantity issues, hydrologic hazards, water availability, water use, and aquatic ecology. George Hallberg, of the The Cadmus Group, Inc. chaired our committee.

Water is our most fundamental natural resource, a resource that is limited. Challenges to our nation's water resources continue to grow, driven by population growth, ecological needs, climate change, and other pressures. The U.S. Geological Survey (USGS) historically has been a primary source for scientific data and assessments to understand and facilitate the management of the nation's resources. The Water Resources Discipline (WRD) fills this mission by assessing the quality and quantity of the nation's surface water and groundwater; the WRD mission is "to provide reliable, impartial, timely information needed to understand the nation's water resources." With no regulatory or resource management responsibilities, the WRD is recognized and well regarded as a source of unbiased hydrologic data and scientific information. The Committee on Water Resources Activities at the U.S. Geological Survey, of the Water Science and Technology Board of the National Research

Council (NRC), was asked to carry out a review of the USGS WRD activities and provide constructive advice to help the WRD meet the nation's water needs.

PERFORMANCE REVIEW

Leadership

The USGS deserves credit for past leadership in many areas of water science and technology. Since 1889, the USGS has operated a streamgaging program that evolved into The National Streamflow Information Program (NSIP) which now makes real-time streamflow data widely available, a remarkable advancement. The WRD developed methods to measure and predict streamflow and sediment transport and the science of fluvial geomorphic systems. WRD scientists and engineers were leaders in developing the foundations of groundwater hydrology; they developed approaches to understand the chemical and isotopic evolution of natural groundwater. WRD has used its unique position in the USGS, incorporating water, solid Earth, ecological science, and geographical information systems to promote large-scale interdisciplinary assessments for management of water resources and aquatic ecosystems. External stakeholders praised the WRD's leadership and commitment to long-term data collection, fundamental to water science studies of other parties and critical to understanding the nation's water resources. The WRD provides leadership in fundamental areas such as standardizing data collection methods across the nation. Recent topical examples of their leadership are their work in: national syntheses of water quality; national studies of emerging contaminants; furthering the understanding of groundwater-surface water interactions; integration of biological assessments into water quality monitoring; and technology transfer of groundwater modeling and watershed scale water-quality modeling.

Coordination

Other USGS Disciplines, DOI agency partners, and external agencies praised the coordination and collaborative efforts of WRD as well as the importance of WRD's work to their own programs. Examples include collaborations on hydrologic and ecologic science of the Platte and Missouri Rivers, the assessment of groundwater resources and earthquake hazards in the Los Angeles basin, and the study of groundwater resources of the middle Rio Grande basin. The WRD provides leadership in coordinating federal water activities through the Advisory Committee on Water Information and the Subcommittee on Water Availability and Quality (under the National Science and Technology Council, Executive Office of the President), for example. Hydrological science and streamflow observations that undergird flood watches and warnings provided by the National Weather Service's (NWS) River Forecast Centers and the NWS and WRD closely coordinate the provision of these products and services. The WRD also collaborates with the U.S. Environmental Protection Agency, with examples of activities including co-sponsorship of the biennial National Monitoring Conference, joint work on the "National Hydrography Dataset Plus," and extensive work on water quality and emerging contaminants. WRD data and interpretive studies are used as key performance indicators by other agencies and institutions.

Balance

The WRD program areas and balance measures the committee was asked to assess are based on funding, and derived from a WRD *Strategic Directions* plan, and individual program plans, that are nearly a decade old. The data to review "program balance" by these measures are no longer readily available. The USGS has a new strategic plan *Facing Tomorrow's Challenges—U.S. Geological Survey science in the decade 2007-2017* which will presumably drive program development over the coming years. With that perspective, we offer this **Recommendation: In the past, the USGS WRD program balance was assessed through the *Strategic Directions* plan. If it is judged important for the USGS, DOI, or OMB to review program balance by these particular metrics, the budget**

system should be adjusted to accommodate such summaries. In the committee's view the question might not be balance of the past; rather, future planning needs to balance program goals with a more coherent view of how each advances the national understanding of major water problems.

Cost Effectiveness

There are not well-defined metrics to evaluate the "cost-effectiveness" of scientific and intellectual programs such as the USGS. We assessed whether the WRD programs are "well-managed and conducted in a cost-effective manner". Based on our best professional judgment as an expert panel, and on various semi-quantitative measures including assessment of product demand, efforts to optimize field programs, and the use of expert panels to evaluate their programs we found that the USGS is run in a cost-effective manner.

PREPARING FOR TOMORROW

There are many trends of increasing stress on the nation's water resources – these form "predictable surprises" – problems that are becoming recognized and require action that will not solve themselves. *Problems of water availability will become increasingly more serious and prominent; Climate change will make water resource challenges more difficult; Water quality impairments will continue to be a daunting issue; Water prices will rise*; and *Resolving water conflicts and policy debates will demand more water science.* The performance review of the USGS WRD and their legacy of leadership in addressing the nation's key water problems provide a rationale for a strong USGS presence in the water-science arena today and tomorrow.

The WRD, like all federal agencies, has a "top-down" component of management where broad national priorities are set by policy makers and Washington level management with input from national stakeholders. The WRD also has a unique "bottom-up" component to its planning process with Science Centers in every state. The Science Centers operate with direct input from state and local stakeholders,

providing insights to local water issues and identifying new and emerging national issues. Appropriate issues then surface to the regional and national level and become incorporated into "top-down" programmatic thrusts. This mix of "top-down" and "bottom-up" input to management and priority setting has served the USGS well. However, the committee is concerned that the balance between national priorities and local needs has become skewed as a result of budgetary issues.

The WRD budget trend over the past 16 years has been flat or slightly downward. The only major component that has risen since 1990 is the state and local funding for the Cooperative Water Program (Coop program). There is a growing disparity between cooperator and federal contributions to the Coop program. WRD staffing, both science and non-science employees, has declined by one-third since 1993 as a result of flat-to-declining budgets and mandated salary increases and promotions. The National Research Program (NRP) research hydrology staff has been reduced by 30 percent while WRD headquarters staff has been reduced by 60 percent. Amidst the overall decline in staff, there has been an increase in research grade hydrologists in Science Centers. In sum, there has been a net decrease in research positions and a de-centralization of the WRD research capacity. This redistribution has promoted a higher level of science in the field offices but possibly to the detriment of the NRP. Coupled with these large reductions in staff there have been limited new hires, resulting in an aging workforce, particularly in the NRP where the modal age is now 51-60 years old.

Even with these budgetary and staffing reductions the USGS WRD has an experienced, interdisciplinary workforce of water scientists and technicians that are needed to address the nation's growing water problems. They stand on a long tradition of studying the impact of human activities on water resources and ecosystems as well as a "top-down" "bottom-up" structure that positions the agency to respond to water issues. Whether society can manage water resources sustainably in light of the growing pressures such as population growth, wealth production, ecosystem needs, and climatic uncertainty has become a signature environmental issue of our age. The WRD is well suited to play a critical leadership role in a national strategy for water resource management.

WATER FOR TOMORROW

The USGS WRD has provided leadership to the nation in water science, and while that leadership continues, it has lost ground. The WRD is stretched too thin—it cannot address all water resources issues particularly given the current budgetary constraints. The WRD and USGS have the range and quality of scientific resources to take the lead in providing the interdisciplinary understanding required to address many of our pressing water problems. But it needs to re-focus its vision and concentrate on its strengths to address not all, but the critical, water challenges facing the nation. **Recommendation: The WRD should re-focus its vision on critical national priorities to lead the nation in water science.** This vision should bring its data acquisition arm, science and interpretive programs, and research arm to a common focus on key national priorities.

The new USGS strategic plan, *Facing Tomorrow's Challenges—U.S. Geological Survey science in the decade 2007-2017,* outlines the agency's plans to move into the future, identifying six strategic directions. While the committee did not do an in-depth evaluation of this plan, we do concur with the importance of the national issues outlined and agree that the USGS has the skilled personnel to address these issues. The strategy notes "[The USGS's] *role is larger than the traditional one of providing expertise in mapping, geology, water, and biology. … The USGS should transform its approaches to problem solving not only to address the issues of today but also to prepare for those of tomorrow*." We concur and put our recommendations in the context that the WRD focus on the problems society will face in the coming decades. Water science is a key component in each of the six USGS directions, demonstrating the necessity of an integrated strategy. By integrated we mean ensuring that all the WRD programs understand the component contributions they must make to answer critical national questions. There are two dominant themes of the plan that can relate to all areas of water availability—climate variability and change and a water census.

Recommendation: The WRD needs to clearly redefine its role within the context of the USGS strategic science directions and its vision of critical national water priorities. This redefinition should highlight the WRD's role in the USGS strategic science directions and within an integrated strategy and programmatic approach to address their defined national water priorities, emphasizing scientific support for decisions that society will need to make in the coming decades. This approach should include two key issues of water availability—the water census and climate variability and change—particularly forecasting and predictions, evaluating uncertainty, and developing enhanced monitoring systems to assess the nature of the water resources problems.

The Water Census is a needed and worthy activity, especially considering its subtitle to "*quantify, forecast and secure fresh water for America's future*." The Water Census needs to plan for establishing an ongoing accounting of water availability in a program on par with the social and economic censuses that support national decision-making. There is little value in developing a sparse, simplistic accounting system while there is relevance in building a dynamic Water Census. This would involve many efforts that go beyond the current scope of the USGS programs, efforts that are discussed and recommended in this report.

To focus on key national problems in an integrated way requires hard decisions about how programs like the Water Census are developed and integrated across the WRD. This will require active management, development of common strategic questions and a common intellectual approach. Priorities should be promoted aggressively at the highest level of leadership, managed at this level to ensure implementation, using teams capable of making important scientific contributions of national and international relevance. Overall, the single most important trait that WRD management will need to demonstrate in the next decade is willingness to actively lead the agency's scientists in the new directions required by the nation's needs. **Recommendation: The USGS and WRD leadership should refocus their vision to define the national water priorities that they will address and**

develop a management approach to integrate the WRD programs to meet these needs and lead the nation in water science.

Pressing national issues will require integration of WRD programs, from the Ground Water Resources program, to the National Water-Quality Assessment (NAWQA) program and NSIP, the NRP and the Coop program. While many of the WRD programs have line-item budgets and defined missions, they can still be integrated to address questions that address key components of water priorities. Many of these national issues will also require new science, thus the approach to integrate the WRD's focus on national priorities must also better leverage the science and technical prowess of the NRP and the operational capabilities within the Science Centers. Two difficult challenges, in the committee's observations, will be to define and manage the role of the NRP and the Coop Program - Science Centers in these national priorities.

The National Research Program.

With the decline in the number of scientists, the aging of its workforce, and the decentralization of research capacity, the NRP has lost some measure of its scientific leadership. The NRP needs to play a renewed, significant role and have the flexibility to refocus on significant water science.

Recommendation: To meet the nation's water science needs, the WRD's National Research Program should be aligned around its refocused vision of national program priorities. The USGS should also revisit its review and reward system for research grade personnel which should ensure that priorities for career advancement are aligned with agency and national priorities. It should provide incentive for team-oriented work, and substantive contribution to and leadership of projects that address critical national priorities.

The Cooperative Water Program and Science Centers.

A sharper focus on national needs will also require improved alignment of the Coop program and the Science Centers to address regional and national priorities. New science needed to address national water problems often must be tested and tailored to the wide range of climatic, hydrologic, cultural, and industrial-economic conditions that exist throughout the United States. The presence of the Science Centers and Coop program in every state is an important resource to accomplish regional and national objectives if projects are coordinated to do so. **Recommendation: The WRD's Cooperative Water Program needs to be better integrated with the WRD's focused vision of regional and national water program priorities.** The WRD is encouraged to develop a process for defining national merit for Coop projects as a means of balancing Coop program commitments with meeting regional and national priorities. Science Center research grade scientists will need to be more flexible for integration in project teams coordinated around the national strategic directions, similar to the NRP. **Recommendation: The USGS WRD should involve all research grade personnel in staffing teams to address regional and national research priorities, regardless of location, to increase the agency's flexibility.** This must be done with care, considering state needs; as WRD focuses more on regional and national-scale problems, it is important that the best aspects of their contributions to local problems not be undermined or abandoned.

The committee advocates a more targeted selection of water science projects that address critical national needs. Programs and projects should be integrated at a high level with teams capable of making important scientific contributions. Interpretive activities will need to better focus on regional and national syntheses and forecasting and predictions to address national priorities. To successfully meet the water and energy challenges the United States is facing the USGS will need to provide new and improved water science. As stated in the USGS 2007 strategic plan—"*The USGS must transform its approaches to problem solving not only to address the issues of today but also to prepare for those of tomorrow*." The sharper focus on critical priorities will help to address these problems; but to adequately meet the nation's water challenges it will clearly require new and

additional resources. **Recommendation: To ensure a secure water future for the nation, sufficient funding should be provided for the USGS to perform its function as a major science agency: to ensure high quality data collection, interpretive programs, and development of essential forecasting and predictive tools to support effective management of the nation's critical water resources.** This concludes my statement. Thank you, Madam Chairman and members of the Committee, for the opportunity to testify today. I welcome any questions you may have.

Roland C. Steiner is Regional Water and Wastewater Manager for the Washington Suburban Sanitary Commission. He is responsible for developing and maintaining the major functional and financial relationships between WSSC and adjacent utilities, including management and funding of cost-shared water supply reservoirs and advisory services, water curtailment agreements, and reconciliation of WSSC's capital funding at several wastewater treatment plants. Previously he was Associate Director for Water Resources and Director of Cooperative Water Supply Operations on the Potomac for the Interstate Commission on the Potomac River Basin. There, he was responsible for directing the water resources program of the Commission including covering coordinated drought supply management of river and reservoir resources for the Washington, DC region. He is a Professional Engineer in Maryland, and a member of the American Society of Civil Engineers, American Water Works Association, and Water Environment Federation. He has a B.Sc. in Civil Engineering from the University of Pennsylvania, and M.Sc. in Civil Engineering: Engineering-Economic-Planning from Stanford University, and a Ph.D. in Environmental Engineering from The Johns Hopkins University.