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COMPLETE STATEMENT

OF

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BEFORE

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SUBCOMMITTEE ON WATER AND WILDLIFE

UNITED STATES SENATE

ON

FINDING COOPERATIVE SOLUTIONS TO ENVIRONMENTAL CONCERNS WITH THE CONOWINGO DAM TO IMPROVE THE HEALTH OF THE CHESAPEAKE BAY

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Chairman Cardin and members of the Subcommittee, I am Colonel J. Richard Jordan III, Commander of the Baltimore District, U.S. Army Corps of Engineers. Thank you for the opportunity to testify today about our organization's role in addressing the issues of sediment transport along the Susquehanna River, and specifically, to discuss the Lower Susquehanna River Watershed Assessment. This watershed assessment is being conducted by the Corps in coordination with numerous stakeholders, with the State of Maryland as the project sponsor.

OVERVIEW

The Corps is a unique organization, with a diverse military and civil works mission. The Baltimore District executes a Civil Works mission primarily in the interest of flood risk management, aquatic ecosystem restoration, and navigation throughout the Chesapeake Bay watershed above the Virginia state line, which spans the lengths of the Susquehanna and Potomac Rivers, including parts of New York, Pennsylvania, Delaware, Maryland, Virginia and West Virginia, as well as the District of Columbia.

Included in the Corps' diverse mission -- and related to the topic here -- is our role and responsibility in watershed planning. Watershed planning goes beyond planning for an individual project toward a more comprehensive strategic evaluation of the entire watershed. Watershed planning addresses the identified water resource needs in the watershed and is done collaboratively with other Federal, state, and local entities to determine goals for improving the watershed without regard to who might take specific actions to help meet those goals. While watershed plans may identify potential opportunities for Corps actions, which could not be taken without further analysis, this is not a primary consideration or goal of watershed planning. The planning process helps create a more complete range of potential solutions and is more likely to identify the most technically sound, environmentally sustainable, and economically efficient means to achieve the goals for the watershed over the long term. This information is then made available to local sponsors, other agencies, and organizations within the watershed for their own project planning, to create effective, collaborative, and synergistic improvement throughout the watershed.

LOWER SUSQUEHANNA RIVER WATERSHED ASSESSMENT

In 2011, the Corps partnered with the State of Maryland through its Departments of the Environment and Natural Resources to conduct a watershed assessment of the Lower Susquehanna watershed under Section 729 of the Water Resources Development Act of 1986. A watershed assessment is the first step toward the development of a watershed plan. This watershed assessment (which will be released for public review later this year) will characterize the very complex relationships between river flow, sediment and ecological resources in the Lower Susquehanna River system and the upper Chesapeake Bay. Mathematical modeling and watershed data were used to analyze sediment management strategies and estimate impacts from the use of these strategies to better inform stakeholders undertaking efforts to restore the Chesapeake Bay. This analysis considered the impacts of hydroelectric dams along the River south

of Harrisburg, Pennsylvania that routinely trap sediment. Although a significant amount of information on the system was available, this assessment helped close some data gaps. The completed assessment will provide information to decision makers on sediment transport through the system, which may impact how nutrient, sediment and habitat restoration goals for the Chesapeake Bay are achieved.

Throughout the entire process, we have worked with a variety of Federal, state, and local agencies that have been crucial in the assessment's development. Both the U.S. Geological Survey and the Corps' Engineering Research and Development Center are participating in major technical portions of the assessment along with the Susquehanna River Basin Commission, The Nature Conservancy, the U.S. Environmental Protection Agency – Chesapeake Bay Program, and the Maryland Department of Natural Resources' Maryland Geological Survey. Together, these agencies make up the Lower Susquehanna River Watershed Assessment interagency team.

Outside of the interagency team, there are various agencies, non-governmental organizations and other stakeholders that have attended quarterly meetings and provided feedback and information throughout the assessment process. These include but are not limited to: Pennsylvania Department of Environmental Protection, Pennsylvania Department of Conservation and Natural Resources, Pennsylvania Fish and Boat Commission, Exelon, the Lower Susquehanna Riverkeeper, the National Oceanic and Atmospheric Administration, the University of Maryland Center for Environmental Science, U.S. Fish and Wildlife Service, Chesapeake Bay Commission, Chesapeake Bay Foundation, Chesapeake Conservancy, Chesapeake Research Consortium, Conservation Fund, Coastal Conservation, Maryland Port Administration, Baltimore City Government, the Pennsylvania governor's office, the Maryland governor's office, and the Wildlife Management Institute.

So why is this collaborative effort significant? The Chesapeake Bay is the largest estuary in the United States and the Susquehanna River is its largest tributary, supplying the most freshwater to the Bay as well as serving as its largest source of sediment and nutrient loads. Federal agencies share a renewed commitment to restore the Chesapeake Bay embodied in President Obama's Executive Order 13508, Chesapeake Bay Protection and Restoration. This executive order established the Federal Leadership Committee, which in turn, developed the Federal Action Strategy that set goals and objectives to be accomplished by the federal government, working closely with state, local, and non-governmental agencies, to protect and restore the health of the Chesapeake Bay. The Federal Action Strategy document specifically assigns the Corps the "lead" role to "…advance studies to evaluate the management of sediments…" in the lower Susquehanna River watershed. The interagency team, as well as the various agencies that are providing feedback and information throughout the assessment process, seek to integrate water resources management in the lower Susquehanna River watershed to ensure sustainable restoration of the Chesapeake Bay.

Though the effects of sediment on the Chesapeake Bay have been researched, past studies have not examined, from a watershed perspective, how dams impact sediment

transport from the lower Susquehanna River to the Chesapeake Bay. The assessment area consists of the lower Susquehanna River watershed from Sunbury, Pennsylvania, through the confluence with the Chesapeake Bay and into the upper Chesapeake Bay, where impacts are likely to be the largest.

The series of hydroelectric dams includes: York Haven, constructed in 1904, which forms Lake Frederick; Safe Harbor, constructed in 1931, which forms Lake Clarke; Holtwood, constructed in 1910, which forms Lake Aldred; and Conowingo constructed in 1928, which forms Conowingo Reservoir. The Conowingo has the largest storage capacity of the dams in the series and is the closest to the Chesapeake Bay. Sediments and associated nutrients from the land, floodplain, and streams in the lower Susquehanna River have been transported and delivered to the reservoirs behind the dams over the past century. Previous studies indicate that the dams have historically acted as sediment and associated nutrient traps, thus reducing the amount of sediments and nutrients reaching the Bay.

When this assessment started in 2011, the concern of stakeholders was that as the reservoirs behind each dam fill and reach a steady state, or equilibrium, the dams would no longer capture sediments and associated nutrients. Those stakeholders were concerned that there might be a significant increase in the daily input of sediment and nutrients to the Bay, which could undo the progress made by continued restoration strategies in New York, Pennsylvania, and Maryland. Also, many stakeholders were interested in sediment transport from the watershed during storm events, when previously deposited sediment would be scoured—or moved—from the reservoirs and delivered to the Bay.

To examine how the series of dams functioned, mathematical models are being used to simulate sediment transport through the lower Susquehanna River watershed under various scenarios. The technical work of the assessment is essentially complete; however, the report is in draft and currently undergoing review. The technical work associated with the assessment considered the trapping capacity for the series of reservoirs. Historical records indicate that the trapping of sediments at the Conowingo is limited compared to decades ago, but trapping of more than half of the sediment coming down the river still occurs. At the current time, each reservoir has reached a state of dynamic equilibrium. This means that after high flow storm events large enough to cause mass scour, which, according to historical flow data, occur on average every 4-5 years, the sediment storage capacity will temporarily increase, allowing for more reservoir deposition in the short term. This causes a periodic “cycle” with an increase in load to the Chesapeake Bay from scour also resulting in an increase in storage capacity, followed by reduced loads transported to the Chesapeake Bay due to reservoir deposition. As a result, we expect to continue to see periods of trapping followed by scour events along the Susquehanna River into the Chesapeake Bay. Long-term storage capacity of each reservoir is cyclical and overall the inflow of sediment will equal the outflow.

The assessment also considered the increased health impacts to the Chesapeake Bay ecosystem. These impacts would be primarily due to attached nutrients, not necessarily the sediment itself. After a mass scour event, estimates showed that the sediment

settles quickly and is not the major threat to aquatic life. However, scoured nutrients stimulate algal growth that reduces life-sustaining dissolved oxygen, particularly in the deeper waters of the upper Chesapeake Bay. Modeling and monitoring show this state could persist for multiple seasons. Additionally, the impact to habitat and living resources is tied to the timing of the scour event. That is, a scouring event in spring has greater adverse impacts to water quality and living resources than fall or winter events.

Sources, to include the watershed and scour from the other reservoirs upstream of the Conowingo Dam, were also considered. Modeling estimates of the most recent mass scour event, Tropical Storm Lee in September 2011, indicate that the Susquehanna River watershed located above the Conowingo Dam provided 80 percent of the load delivered to the Bay, with the remaining 20 percent scoured from the sediment trapped in the Conowingo Reservoir. These sources deliver more sediment and nutrients and, therefore, more impacts on the Bay ecosystem, than do the scoured sediment and associated nutrients from the reservoir behind Conowingo Dam.

With or without a Conowingo reservoir that is essentially full of sediment, the watershed contributions of sediment and nutrients during large storm events will have significant effects on the Bay's living resources. Analyses by the Environmental Protection Agency also indicate that implementation of Watershed Implementation Plans (WIPs) that manage watershed loads and detail how and when surrounding Bay states will meet load (nitrogen, phosphorus, and sediment) allocations as part of the Chesapeake Bay Total Maximum Daily Loads (TMDL), are estimated to have a far larger influence on the health of the Bay in comparison to scouring of the reservoirs. In fact, over the past 30 years, due to existing regulatory and voluntary nutrient and sediment reduction strategies in the watershed, nutrient and sediment loads to the Lower Susquehanna River are already significantly reduced from what was delivered in the mid 1980's.

Modeling done for this assessment estimated that under current conditions, which did not include the positive impacts of WIP implementation, more than half of the deep water habitat, and much of the shallow water habitat, in the Bay is frequently not suitable for healthy fish, bottom-dwelling and plant communities based on TMDL standards. Under conditions which include WIP implementation, all Chesapeake Bay habitats meet TMDL standards. However, when WIPs are implemented and a mass scour event occurs, only a limited amount of the deep water habitat within the Chesapeake Bay does not meet TMDL standards due to insufficient dissolved oxygen. Shallow water and non-deep water habitat is minimally impacted and still meets TMDL standards.

In addition to looking at how sediment transport impacts the Chesapeake Bay, this assessment's report will lay out a survey-level screening of management strategies. This will evaluate the management of sediment loads and nutrients associated with those loads.

The assessment considers a variety of sediment management strategies- to reduce the amount of sediment available for a scour event. These include reducing sediment inflow to the reservoirs, minimizing deposition in the reservoirs, and increasing storage capacity of the reservoirs. The assessment report will include an analysis of the

effectiveness, sustainability, and cost-effectiveness of strategies. Note that the assessment does not assign responsibility for implementing those strategies to any party and does not recommend a future Corps project; the implementation of any of these strategies by the Corps would require specific feasibility study.

One such sediment management strategy considered was dredging to increase storage capacity of the reservoirs. Dredging behind the Conowingo Dam with upland sediment disposal would be required annually, or on some regular cycle, to achieve any sustained improvement to the health of the Bay. It was estimated that the annual cost of such a program would likely be on the order of $50 million to more than $250 million, with costs likely increasing in future years as placement sites become less convenient. Further, the positive impacts that dredging may produce are significantly minimized because the majority of the sediment load during a scour event is coming from the watershed.

The management of nutrients, dissolved and attached, is likely more important than management of sediments to the health of the Chesapeake Bay. Therefore, nutrient management options would be more cost effective and provide more flexibility than solely relying on management options focused on sediment only. However, the assessment did not consider these options.

Throughout the assessment process, analytical tools were used. We recognize that, like all mathematical models applied to simulate complex physical processes, the modeling tools used in this effort have uncertainties. However, they represent the best tools currently available for evaluating sediment and nutrient dynamics in the lower Susquehanna River and Chesapeake Bay watershed, and have been used extensively with good results. These models have been peer-reviewed during previous studies and their application in this assessment will be peer-reviewed by various groups including the Chesapeake Bay Program Scientific and Technical Advisory Committee.

So, where do we go from here? The assessment report will undergo a series of internal and external reviews, including a public comment period. Stakeholder outreach will continue and includes a public website, social media outreach, updates at associated meetings, and continued coordination with the various Federal, state and local agencies. When finalized, we expect the Lower Susquehanna River Watershed Assessment to provide useful information to help stakeholders and decision-makers better understand the very complex relationships between river flow and sediment and ecological resources in the Lower Susquehanna River system and the Chesapeake Bay. Beyond this assessment, monitoring, research and further modeling by involved parties can help us understand nutrient processes and their impacts on the Chesapeake Bay's ecological resources.

The Corps remains committed to working in partnership to address the watershed planning needs of the Susquehanna River Basin and specifically as it relates to sediment and nutrient transport and its impact on the Chesapeake Bay. Mr. Chairman, thank you for the opportunity to testify here today and I would be happy to answer any questions you or other Members of the Subcommittee may have.