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Good morning Chairman Cardin, Ranking Member Sessions, and Members of the Subcommittee. I am pleased to appear before you today to discuss the EPA's mission to protect public health and the environment in the context of the water quality challenges from what is known as "nutrient pollution." This pollution, which comes from high levels of nitrogen and phosphorus, threatens the quality of the Nation's waters and the prosperity of communities across the country. This urgent problem requires effective collaboration at the federal, state, and local levels to address the growing environmental and public health risk and its economic impacts.

I am pleased that Chief White of the Natural Resources Conservation Service (NRCS) and Associate Director Werkheiser of the U.S. Geological Survey (USGS) are also testifying with me today. NRCS and USGS deliver important programs and scientific expertise that play critical roles in protecting the quality of our waters and addressing nutrient pollution.

My objective today is to provide the Subcommittee with our understanding of the problem of nutrient pollution, including the contributions from various sources, as well as the various

approaches and tools that the EPA, other federal agencies, states, regulated entities, and others have employed – working together – to address this critical problem.

We all recognize the value of clean water. Clean water is not simply a resource and asset to be passed on to our children; it is an essential part of life. Clean water is essential to public health, drinking water supplies, quality of life, and the welfare of families and communities, whether in large cities, small towns, or rural America. The health and growth of small and large businesses and the jobs they create rely upon a high quality and sustainable source of water. The range of businesses that depend on a reliable and plentiful supply of clean water include tourism, farming, fishing, beverage production, manufacturing, transportation, and energy generation, just to mention a few.

Extent of the Nutrient Pollution Problem

Nitrogen and phosphorus pollution is a major threat to clean water. This has been extensively documented in the scientific literature and confirmed by monitoring data collected at federal, state, and local levels. States have identified more than 15,000 waters nationwide that have been degraded by excess levels of nutrients to the point that they do not meet state water quality standards. The EPA's most recent National Aquatic Resource Surveys of aquatic health found that of the stressors assessed, nitrogen and phosphorus are the most pervasive in the Nation's small streams and lakes. Approximately 50 percent of streams and more than 40 percent of lake acres have high or medium levels of nutrients.

Contamination of coastal waters by nutrient pollution is also a widespread and growing problem. For example, a recent analysis of 647 U.S. coastal and estuarine ecosystems indicates that the percentage of systems with low oxygen levels or hypoxia (a common result of high nutrient levels) has increased dramatically since the 1960s and has become measurably worse even since the 1980s. The first national assessment of oxygen conditions in U.S. waters, conducted in the 1980s, found 38 percent of systems to have hypoxia. Updating the information using today's data finds that 307 of 647 ecosystems, or 47 percent, experience hypoxic conditions. Severe hypoxia can result in "dead zones," an occurrence that unfortunately is occurring in increasing scope and magnitude in many of the Nation's coastal waters.

An increasingly widespread and persistent result of nutrient pollution is the proliferation of harmful algal blooms – a situation in which waters are choked with algae and green with slime. Moreover, some harmful algal blooms produce toxins that threaten public health, aquatic life, food sources, and drinking water quality. Because of the increased incidence of these and other risks, many states actively monitor their waters for harmful algal blooms to protect swimmers, assure safe recreational uses, and protect consumers of shellfish. Some states, for example Kansas, Ohio, and New York, have public websites to post advisories warning citizens about the dangers of public waters that are impacted by harmful algal blooms.

During the summer of 2011, communities across the country were affected by harmful algal blooms in their waters:

- In Oregon, the state's health authority reports that 18 lakes and reservoirs affected by cyanobacteria led to nine closures that lasted from 11 to 62 days during the vital summer months. Additional closures remain in effect today;
- The Kansas Department of Health and Environment has issued public health advisories for four lakes, warning residents that the water is unsafe for human or animal consumption and contact due to cyanobacteria. Eight additional Kansas lakes have public health warnings that advise no contact with the water;
- The Associated Press reported on September 21 that low levels of cyanobacterial toxins have been detected in the Kansas River, a major drinking water source for nearly 60,000 residents in eastern Kansas, prompting studies on the potential effects of the toxins on people and the local environment;
- In Oklahoma, cyanobacterial blooms that started to develop before the Fourth of July continue to affect seven lakes in the state. Beaches at four lakes remain closed, while six lakes have advisories discouraging swimming and other recreation on the water;
- In Ohio, Grand Lake St. Marys has received national attention for massive algal blooms that have led to deaths of fish, birds, dogs, and illnesses in at least seven people. These blooms have resulted in widespread economic losses due to beach closure and lower tourism revenue, and have threatened an important drinking water source for about 10,000 people. The public health advisory for the lake that was issued in May was just lifted after four months, according to the Ohio Environmental Protection Agency; and
- Additional toxic algal blooms have been reported in fresh waters in the State of Washington and the Great Lakes, while marine harmful algal blooms have been reported in Florida and Massachusetts.

Nutrient pollution can also affect the water that we drink. Levels of nitrate (a compound of nitrogen) in drinking water above the federal drinking water standard of 10 milligrams per liter have been linked to serious illness in infants, as well as other potential human health effects. Reported violations for nitrate standards at public water systems have doubled in the last eight years, with more than 1,000 violations in 2010. In the face of high nitrate levels, water systems have had to install treatment in order to remain in compliance. For example, in Lancaster County, Pennsylvania, more than 140 surface and groundwater systems have had to invest in new technology such as ion exchange treatment in order to clean up nitrate contamination and protect public health. The City of Fremont, Ohio is building a new \$15 million drinking water reservoir in response to high nitrate levels in the Sandusky River.

Nitrate can also be a risk to the 15 percent of Americans that use private wells that are not regulated under the Safe Drinking Water Act. Just this past year, USGS published a report that found nitrate levels in groundwater to exceed the federal drinking water standard of 10 mg/L in more than 20 percent of the shallow (less than 100 feet below the land surface) private water wells in the agricultural areas that it tested. This raises a potential concern for people in rural areas who rely on shallow wells for their water supply because of the potential for nitrate contamination. Although most public water systems that use groundwater sources get their water from deeper wells, USGS advises that nitrate may become a concern even for these systems, as surface pollution infiltrates and could contaminate deeper municipal drinking water supply aquifers.

In addition to the well-documented relationship between high nitrate levels and increased risk of serious illness in infants, nutrients can contribute to drinking water contamination in other ways. For example, toxins released by harmful algal blooms caused by high nutrient levels can pose risks to public health and aquatic communities. When not properly treated, the ingestion of water contaminated with these toxins can have health impacts on the liver, kidney, or nervous system. Additionally, higher levels of algae caused by nutrients in drinking water sources can increase the formation of byproducts from disinfection processes used at drinking water facilities. Exposure to disinfection byproducts can pose public health risks, due to their potential carcinogenicity and possible reproductive and developmental health risks. Removing these contaminants once they are formed can be expensive. The best way to address these byproducts is to prevent their formation in the first place.

Contributions from Various Sectors

The sources of nitrogen and phosphorus pollution to a waterbody depend on activities surrounding and upstream of a particular waterbody. In general, the primary sources of nitrogen and phosphorus pollution in urban and suburban areas are stormwater runoff and municipal wastewater treatment systems. In rural areas, towns and cities continue to be an important contributor, but the predominant sources are waste from agricultural livestock activities and excess fertilizer from row crops.

Stormwater : Stormwater can collect fertilizers and other applied nutrients, as well as other pollutants on impervious surfaces, before it is discharged to receiving waters.

While urban stormwater may have lower nutrient concentrations than other nonpoint

sources of pollution, urban watersheds produce a much larger annual volume of runoff, such that the mass of nutrient pollution generated from stormwater can be significant.

Wastewater Treatment Systems: U.S. municipal wastewater treatment facilities currently treat about 34 billion gallons of wastewater per day. Depending on the local ecological conditions and their relative contribution, discharges from publicly owned treatment works (or POTWs) can be a significant source of nutrients. POTWs receive permits under the Clean Water Act to reflect both technology-based secondary treatment requirements and applicable water quality standards. Onsite and decentralized wastewater treatment systems (or septic systems) are used in approximately 20 percent of U.S. homes and can also be a significant contributor to nutrient pollution.

Livestock Waste: Animal agriculture production results in the generation of more than 1 billion tons of manure each year, resulting in more than 8 million pounds per day of nitrogen and 3 million pounds per day of phosphorus.¹ Much of the manure is applied to farmland as fertilizer for crops. If done appropriately using the four “R’s” – right rate, timing, method, and form – nutrients are applied so that they can be taken up by crops, and water quality impacts are minimized. However, if applied without considering the four R’s, this manure may enter nearby waters and thereby contribute to nutrient pollution. Large feedlots and dairies (referred to as Concentrated Animal Feeding Operations) are required to obtain a Clean Water Act permit if they discharge pollutants, including nutrients, to waters of the United States. Smaller livestock production

¹ “An Urgent Call to Action: Report of the State-EPA Nutrient Innovations Task Group.” 2009. Available at http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/upload/2009_08_27_criteria_nutrient_nitgreport.pdf

activities are generally unregulated under the Clean Water Act. EPA and USDA have been working for many years to provide both funding and technical assistance to help farmers better manage their manure, with some success.

Row Crop Fertilizer: Row crop agriculture can contribute nutrients when fertilizer in either manure or chemical forms is applied to but not taken up by crops. Even when fertilizers are applied at appropriate rates, the typical nitrogen utilization by crops is less than 30 percent. A USDA report published two weeks ago notes that reducing nitrogen application rates is the most effective way to reduce reactive nitrogen and that opportunities exist for achieving additional nutrient reductions.² The nutrients not used by crops can volatilize into the air, infiltrate into groundwater or run off the land with stormwater, adding to the problem of nutrient overabundance in the aquatic environment.

Air Deposition: Nationwide, the deposition of nitrogen oxide compounds released to the air during fossil fuel combustion contributes significant inputs of additional nitrogen to the land and surface water. Cars and other mobile sources account for about 55 percent of nitrogen oxide emissions, while stationary sources account for the rest.

Actions to Address the Nutrient Pollution Problem

The EPA recognizes the nation's significant nutrient pollution challenges and is committed to finding collaborative solutions that protect and restore our waters and the health of the communities that depend on them. The growing and costly impacts of nutrient pollution on

² "Nitrogen in Agricultural Systems: Implications for Conservation Policy." 2011. Available at <http://www.ers.usda.gov/Publications/ERR127/>.

human health, recreation, tourism, business growth and expansion, and aquatic ecosystems demand a strengthened and far more coordinated framework of action if we are to succeed in the urgently needed job of reducing nitrogen and phosphorus loadings to our nation's waters.

To reaffirm the EPA's commitment to partner with states and collaborate with stakeholders to reduce nitrogen and phosphorus loadings to the Nation's waters, I sent a memorandum to the EPA's ten Regional offices in March of this year. The memo, entitled *Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions*, lays out a framework for guiding the EPA's work with states and stakeholders to achieve nutrient reductions. The EPA recognizes that states need room to innovate and respond to local water quality needs, and that a one-size-fits-all solution to nitrogen and phosphorus pollution is neither desirable nor necessary.

The EPA believes that the most important tool within an effective state nutrient reduction framework is the development of a statewide list of prioritized watersheds to target the efforts of states and stakeholders to specific watersheds that account for a substantial portion of the nutrient pollution load. Within these watersheds, we can work together to develop stronger permits for point sources, and where appropriate, reduction measures for nonpoint sources, and opportunities to reduce discharges from unregulated stormwater point sources. Our Clean Water Act experience has shown that motivated states, using available tools and high-quality science, can mobilize local governments and stakeholders to achieve significant results. Federal agencies, such as NRCS, play an important role in promoting management practices that can protect and restore waters in these priorities watershed and other areas.

In addition to the significant benefits provided by state watershed targeting, numeric nutrient criteria targeted at different categories of water bodies and informed by scientific understanding of the relationship between nutrient loadings and water quality impairment, are effective and practical tools for the EPA and states to tackle the nutrient pollution problem. The EPA has worked with 25 states across the country to develop and approve numeric nutrient criteria for at least some of their waters, and continues to support and collaborate with others to achieve our common goals.

Once effective watershed plans and nutrient standards are in place, the EPA, states, and stakeholders can work within the existing Clean Water Act framework to identify opportunities for achieving nutrient reductions and take action. Nutrient reductions for point sources of pollution can be achieved through National Pollutant Discharge Elimination System (NPDES) permits, which can be written to include permit limits that result in reduced nutrient discharges to affected waterbodies and therefore healthier waters.

For discharges to waters that states have determined are impaired as a result of nutrient pollution, Total Maximum Daily Loads (TMDLs) provide loading limits for point and non-point sources that, when implemented, will achieve water quality standards. Moreover, in conjunction with USDA and several states, the EPA is exploring “certainty” mechanisms that encourage farmers who are not required to be permitted under the federal Clean Water Act to implement voluntary practices that reduce impacts on water quality and thereby increase the pace and extent to which resource conservation and verifiable water quality improvements are achieved. Under such a

framework, in exchange, the farmer would receive assurances that her actions are consistent with state plans to improve water quality.

Another approach with significant potential is water quality trading, which can provide cost-effective reductions in nutrient loadings within a watershed. Sources that achieve greater-than-required nutrient reductions can receive “credits” that can be traded to other sources that cannot as easily reduce nutrient loadings. Trading can occur between point sources, or between point and non-point sources, which are then usually implemented through permits. The EPA has developed a toolkit for water quality trading that can help identify possible approaches that states, the regulated community, and other sources can use to encourage water quality trading.³

For nonpoint sources, states, territories and authorized tribes can receive grants under CWA Section 319 Nonpoint Source Management Program to support a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, state regulatory programs that prevent or reduce nonpoint source pollution, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects. The program relies on both state-wide Nonpoint Source Management Programs and the development and implementation of watershed plans to effectively reduce pollution. The effectiveness of watershed plans depends on the comprehensiveness of the plan, the management of the grant funds, and how completely the plan is implemented. States and other recipients of Section 319 grants often leverage their grants with resources from other funding sources, such as cost share funding from USDA, and find the broad range of eligible activities under Section 319 to be

³ The EPA’s Water Quality Trading Toolkit for Permit Writers is available at <http://water.epa.gov/type/watersheds/trading/WQTTToolkit.cfm>.

essential for developing and completing effective projects. The Farm Bill also includes funding for a variety of conservation programs, including the Environmental Quality Incentives Program, which offers financial and technical assistance to eligible participants to help plan and implement structural and management conservation practices that address natural resource concerns and offer opportunities to improve soil, water, plant, animal, air and related resources on eligible agricultural land and non-industrial private forestland.

Tools known as Best Management Practices (BMPs) can also be an effective mechanism for reducing nutrient pollution from agriculture, urban stormwater, and other sources. BMPs are effective controls or other practical actions that can be used to mitigate pollution. BMPs are implemented for a variety of purposes, including protecting water resources, human health, terrestrial or aquatic wildlife habitat, and land from degradation by wind, salt, and toxic levels of metals. The primary focus of many BMPs is to reduce the delivery of pollutants into water resources by reducing pollutant generation or by remediating or intercepting pollutants before they enter water resources. These BMPs can be useful in a variety of sectors:

Agriculture: Effective BMPs to control the delivery of nutrients and sediment from agricultural operations can be implemented by a systems-based, site-specific nutrient management planning approach. Evidence shows that these practices are most effective when implemented as a coordinated suite of practices.⁴ Available tools include nutrient source control and avoidance (right rate, timing, form and method of application), in-field control, and edge-of-field trapping and treatment. The optimization of agricultural

⁴ See USDA/NRCS report, “Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Upper Mississippi River Basin,” available at http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1042093.pdf.

fertilizer application can also reduce the amount of nutrients added and limit runoff, thereby helping to reduce nutrient pollution. Reducing fertilizer application can also help a farmer's bottom line.

Stormwater: Hydrology can be a critical driver of water quality impairments in developed and developing areas. Thus, managing runoff to minimize the mobilization and discharge of pollutants is an important component of limiting nutrient pollution from these areas. Implementing BMPs that employ low impact development (LID) and other green infrastructure techniques allows infiltration, evapo-transpiration, and the use of rainwater on-site. Also, grasses or turf can contribute a substantial amount of nutrients from suburban lands, and landowners can employ BMPs to control the losses. Bans or reductions of phosphate in detergents, other cleaning products, and lawn fertilizers can also reduce nutrient pollution from urban areas.

Decentralized Wastewater Treatment: Nitrogen pollution from decentralized wastewater treatment systems can be effectively controlled when cluster treatment systems are implemented to treat effluent from multiple lots at nearby off-site locations, or advanced single-family home systems that reduce nutrient concentrations are installed.

Geographic Initiatives

The EPA is strongly committed to addressing the problem of nutrient pollution and doing so in collaboration with states, tribes and other federal agencies. In addition to the EPA's nationwide efforts to address the nutrient pollution problem, the EPA is also working closely with its

partners in specific geographic areas, including working with states whose waters flow to the Chesapeake Bay, Long Island Sound, the Great Lakes, Lake Champlain, and the Gulf of Mexico. As an example, the EPA is working hard to focus on water quality goals in the Mississippi and Atchafalaya River Basin. The EPA is working with USDA, USGS, and states to provide monitoring support in a subset of USDA's Mississippi River Basin Initiative watersheds. To complement the efforts of USDA and other partners, we are focusing on broader efforts to use funding under Section 319 of the Clean Water Act for watershed planning and stakeholder involvement to enhance USDA programs by engaging creatively in work with communities and watersheds to achieve improvements in water quality. The EPA also serves as co-chair of the Gulf Hypoxia Task Force, which provides a forum for 17 state and federal agencies – including USDA and the Department of the Interior – to partner on efforts to mitigate nutrient loadings and encourage a holistic, cooperative approach. The EPA looks forward to our continued work with Chief White, Associate Director Werkheiser, and their colleagues in this effort.

Additionally, the EPA has engaged states and stakeholders to partner in addressing nitrogen and phosphorus pollution on numerous fronts. In 2009, the EPA helped to lead the nationally focused State-EPA Nutrient Innovations Task Group to evaluate the science, sources, and economic impacts behind the ongoing problem of nutrient pollution and to develop recommendations for controlling the impacts to our nation's drinking water supplies and waterways. The Task Group issued *An Urgent Call to Action*, which provides specific recommendations to the EPA Administrator and the public for joint state and federal actions to

control nitrogen and phosphorus pollution.⁵ The EPA, other federal agencies and the states are also collaborating on the Gulf Restoration Initiative and several joint committees with the Association of Clean Water Administrators, the Association of State Drinking Water Administrators, and the National Association of Clean Water Agencies. Finally, EPA is working closely with USDA, the Department of the Interior, and Chesapeake Bay states to implement the landmark Chesapeake Bay TMDL, which sets a pollution diet for nutrients in the Bay.

Conclusion

The threat posed by nutrients in the Nation's waters is one of the most serious water pollution problems faced by the EPA, the states, and local communities. The EPA is committed to working with our partners at USGS and NRCS, as well as states, other federal agencies, farmers, businesses, communities, and other stakeholders to identify ways to tackle the nutrient problem in a way that protects waters, sustains the economy, and safeguards the well-being of all Americans who depend upon clean and safe water.

Thank you for the opportunity to testify before the Subcommittee today. I look forward to answering any questions you may have.

⁵ The Task Group's report is available at http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/upload/2009_08_27_criteria_nutrient_nitreport.pdf