



U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF INSPECTOR GENERAL

Catalyst for Improving the Environment

Evaluation Report

EPA Needs to Better Report Chesapeake Bay Challenges

A Summary Report

Report No. 08-P-0199

July 14, 2008



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Abbreviations

CBPO	Chesapeake Bay Program Office
EPA	U.S. Environmental Protection Agency
NO ₂	nitrogen dioxide
NO _x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
OIG	Office of Inspector General
TMDL	Total Maximum Daily Load
USDA	U.S. Department of Agriculture

Cover photos: *Clockwise, from top:* Sailboats near Annapolis, Maryland (courtesy National Oceanic and Atmospheric Administration); cows grazing near a stream within the Chesapeake Bay watershed (courtesy Chesapeake Bay Program); a view of the Baltimore Inner Harbor (EPA photo); and a blue crab caught in Maryland (courtesy National Oceanic and Atmospheric Administration).



At a Glance

Catalyst for Improving the Environment

Why We Did This Review

This review summarizes several evaluations conducted by the Office of Inspector General in response to a congressional request. We evaluated how well the U.S. Environmental Protection Agency (EPA) is working with its Chesapeake Bay partners in cleaning up the Bay.

Background

The Chesapeake Bay is North America's largest and most biologically diverse estuary and provides the region economic and recreational benefits. Nutrient and sediment overloading is the primary cause of water quality degradation. EPA's Chesapeake Bay Program Office is charged with coordinating federal, State, and local partners to plan and implement strategies to meet the restoration goals of the Bay.

For further information, contact our Office of Congressional and Public Liaison at (202) 566-2391.

To view the full report, click on the following link:
www.epa.gov/oig/reports/2008/20080714-08-P-0199.pdf

EPA Needs to Better Report Chesapeake Bay Challenges – A Summary Report

What We Found

Despite many noteworthy accomplishments by the Chesapeake Bay partners, the Bay remains degraded. This has resulted in continuing threats to aquatic life and human health, and citizens being deprived of the Bay's full economic and recreational benefits. Through its reporting responsibilities, EPA could better advise Congress and the Chesapeake Bay community that (a) the Bay program is significantly short of its goals and (b) partners need to make major changes if goals are to be met. Current efforts will not enable partners to meet their goal of restoring the Bay by 2010. Further, new challenges are emerging. Bay partners need to address:

- uncontrolled land development
- limited implementation of agricultural conservation practices
- limited control over air emissions affecting Bay water quality

EPA does not have the resources, tools, or authorities to fully address all of these challenges. Farm policies, local land development decisions, and individual life styles have huge impacts on the amount of pollution being discharged to the Bay. EPA needs to further engage local governments and watershed organizations in efforts to clean up the Bay.

What We Recommend

In four prior reports, we made recommendations to the Region 3 Regional Administrator to address individual sector needs (agricultural, developing lands, air deposition, and wastewater). In this summary report, we are making additional recommendations on overall issues to the EPA Administrator.

We recommend that the EPA Administrator improve reporting to Congress and the public on the actual state of the Chesapeake Bay and actions necessary to improve its health. We also recommend that the Administrator develop a strategy to further engage local governments and watershed organizations to capitalize on their resources, tools, authorities, and information to advance the mission of the Chesapeake Bay, and provide the Chesapeake Bay Program Office with the opportunity to comment on proposed rulemaking related to pertinent air issues. EPA concurred with all of the recommendations in this report.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
INSPECTOR GENERAL

July 14, 2008

MEMORANDUM

SUBJECT: EPA Needs to Better Report Chesapeake Bay Challenges –
A Summary Report
Report No. 08-P-0100

FROM: Wade T. Najjum
Assistant Inspector General, Office of Program Evaluation

A handwritten signature in black ink, appearing to read "Wade T. Najjum", is written over the printed name and title of the sender.

TO: Stephen L. Johnson
Administrator

This is our report on the subject evaluation conducted by the Office of Inspector General (OIG) of the U.S. Environmental Protection Agency (EPA). This report contains findings that describe the problems the OIG has identified and corrective actions the OIG recommends. This report represents the opinion of the OIG and does not necessarily represent the final EPA position. Final determinations on matters in this report will be made by EPA managers in accordance with established resolution procedures.

The estimated cost of this report – calculated by multiplying the project's staff days by the applicable daily full cost billing rates in effect at the time – is \$253,615.

Action Required

In accordance with EPA Manual 2750, you are required to provide a written response to this report within 90 calendar days. You should include a corrective actions plan for agreed upon actions, including milestone dates. We have no objections to the further release of this report to the public. This report will be available at <http://www.epa.gov/oig>.

If you or your staff have any questions regarding this report, please contact me at 202-566-0827 or najjum.wade@epa.gov; Dan Engelberg, Director, at 202-566-0830 or engelberg.dan@epa.gov; or Linda Fuller, Project Manager, at 617-918-1485 or fuller.linda@epa.gov.

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What We Looked at and Why

In 2000, Maryland, Pennsylvania, Virginia, and the District of Columbia renewed their agreement to reduce nutrient and sediment loads in the Chesapeake Bay. This was done to improve water quality and remove the Bay from the U.S. Environmental Protection Agency's (EPA's) impaired waters list by 2010. Improving water quality is the most critical element in the overall protection and restoration of the Bay and its tributaries, according to the *Chesapeake 2000* agreement. Nutrient and sediment overloading was identified as the primary cause of water quality degradation within the Bay.

Bay stakeholders questioned whether the needed load reductions will be met. In 2005, U.S. Senator Barbara A. Mikulski of Maryland requested the EPA Office of Inspector General (OIG) to evaluate the Chesapeake Bay Program's progress in meeting its nutrient and sediment reduction goals. We evaluated the Chesapeake Bay Program's efforts in reducing excess nutrients (nitrogen and phosphorous) and sediments from four key sources:

- Agriculture
- Air deposition
- Developing land
- Wastewater treatment facilities

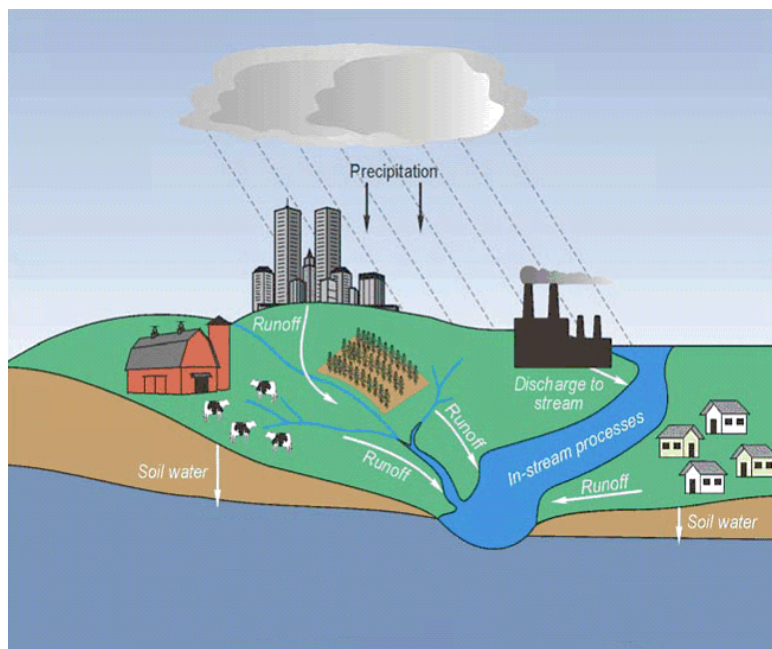


Figure 1: Conceptual Diagram of Nutrient and Sediment Sources and Pathways in the Chesapeake Bay Watershed

Source: U.S. Geological Survey

The diagram in Figure 1 shows how excess nutrients from all four sources end up in the Bay.

We issued separate reports for each topic. Details on our scope and methodology are in Appendix A. In addition to the four areas noted above, in the past few years we issued reports on how EPA grants supported restoring the Chesapeake Bay, and how well federal facilities in the Bay watershed were complying with water permits. A listing of prior reports on the Chesapeake Bay is in Appendix B. Appendix C provide summaries on each of the prior EPA OIG reports,

while Appendix D summarizes the status of recommendations from those prior reports as reported by the Agency.

In 2006, after we had started our reviews, EPA acknowledged that the nutrient goals will not be met by 2010, but did not set a new date. Restoring the Bay's water quality is still far from being accomplished. We integrated the results of all our prior Chesapeake Bay reports to provide this overall assessment of challenges to restoring the Bay. Success is critical not only to the Chesapeake Bay but to other watersheds that use the Chesapeake Bay Program as a model.



Sailing and fishing are popular recreational activities in the Chesapeake Bay (photo courtesy Chesapeake Bay Program).

Why Cleaning Up the Bay Matters

The Chesapeake Bay is North America's largest and most biologically diverse estuary and provides the region economic and recreational benefits. The Chesapeake Bay watershed covers 64,000 square miles and includes parts of six States – Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia – and all of the District of Columbia. A watershed refers to a geographic area in which water drains to a common outlet. As of 2005, about 16 million people lived within the Chesapeake Bay watershed.

However, most of the Bay's waters are degraded. Algal blooms fed by nutrient pollution block sunlight from reaching underwater bay grasses and can lead to low oxygen levels in the water and fish kills. Sediment from urban development, agricultural lands, and natural sources is carried into the Bay and clouds its waters.

Nutrient and sediment runoff have harmed bay grasses and bottom habitat, while disproportionate algae growth has pushed the Bay food web out of balance. Bay habitats and lower food web are at about one-third desired levels. Many of the Bay's fish and shellfish populations are below historic levels. The blue crab population has been below management targets for the past 10 years. Fish and shellfish are at about two-fifths of desired levels.¹ Details on nutrient and sediment contributions to Bay water quality degradation are in Appendix E.

The Bay provides significant economic and recreational benefits to the watershed's population. According to a 1989 economic study by Maryland, the Chesapeake Bay provides economic and recreational opportunities estimated to



Figure 2: Chesapeake Bay Watershed Map

Source: Chesapeake Bay Program Office

¹ Chesapeake Bay 2006 Health Assessment - http://www.chesapeakebay.net/assess/2006_health.htm.

exceed \$33 billion annually. Poor water quality results in waters that do not support fishing, crabbing, or recreational activities.

Finding solutions to cleaning up the Chesapeake Bay will be useful to stakeholders in other bays and estuaries nationwide because they face similar challenges. According to 2006 National Water Quality Assessment data, States reported excessive nutrients and sediment as leading causes of impaired water. States identified wastewater treatment facilities, urban/stormwater runoff, atmospheric deposition, and agricultural practices as the sources of the reported impairments. The Chesapeake Bay partners have pioneered some approaches and can offer valuable lessons learned to other impaired estuaries.



Stormwater carries trash and other pollutants into receiving waters (photo courtesy Chesapeake Bay Program).

Who Is Cleaning Up the Bay?

In an effort to protect and restore the Chesapeake Bay's ecosystem, federal and State agencies, academic institutions, and non-government organizations formed a regional partnership in 1983. The State governments, District of Columbia, and EPA signed various agreements in 1983, 1987, and 2000. The latest agreement, *Chesapeake 2000*, was signed by Maryland, Pennsylvania, and Virginia (the "signatory States"); the District of Columbia; the Chesapeake Bay Commission (a tri-state legislative advisory body); and EPA.



Part of the oyster fleet in Annapolis, Maryland (photo courtesy National Oceanic and Atmospheric Administration).

The Clean Water Act provides EPA's Chesapeake Bay Program Office (CBPO) with the responsibility for coordinating clean-up efforts with its partners in cleaning up the Bay – other federal agencies and State and local governments. EPA is also tasked with assessing and reporting to Congress on the effectiveness of management strategies every 5 years. CBPO, headquartered in

Annapolis, Maryland, is part of EPA's Region 3. Part of the CBPO's charge is coordinating the actions of EPA with its partners in developing strategies to:

- improve the water quality and living resources in the Chesapeake Bay ecosystem, and
- obtain the support of the appropriate officials of the agencies and authorities in achieving the objectives of the Chesapeake Bay Agreement.

The Chesapeake Executive Council meets at least annually and provides the program with leadership and is accountable to the public for progress made under agreements. Membership includes the governors of Maryland, Pennsylvania, and Virginia; the EPA Administrator; the Mayor of the District of Columbia; and the Chair of the Chesapeake Bay Commission.

In *Chesapeake 2000*, the Bay partners agreed to improve water quality in the Bay and its tributaries so that these waters would be removed from EPA's impaired waters list by 2010 and avoid the development of a Total Maximum Daily Load (TMDL).² The non-signatory Bay watershed States of Delaware, New York, and West Virginia also agreed to these water quality goals by signing a six-State Memorandum of Understanding with EPA.

² A TMDL is a calculation of the maximum amount of a pollutant a waterbody can receive and still meet water quality standards, and an allocation (wasteload allocation) of that amount to the pollutant's sources.

Noteworthy Achievements

EPA and its Bay partners have completed many noteworthy activities in their efforts to clean up the Bay. Bay partners have reduced nutrients and sediment even as the Bay's population grows. The following is a summary of just some of the most recent accomplishments as partners or individually.

- Maryland created the Bay Restoration Fund of 2004 that established fees to support enhanced nutrient removal upgrades at wastewater treatment facilities, septic system upgrades, and planting of cover crops.
- Maryland enacted the Clean Cars Act of 2007 requiring the Department of the Environment and the Motor Vehicle Administration to adopt regulations to establish a low emissions vehicle program; vehicle emissions can harm the Bay through air deposition.



Cover crops absorb excess nutrients in the soil and help prevent soil erosion, protecting water quality and aquatic health (photo courtesy Chesapeake Bay Program).

- In 2004, Pennsylvania developed the Agriculture, Communities and Rural Environment initiative that required an additional 5,000 farmers to prepare nutrient management plans for nitrogen and phosphorus, with mandatory buffers from streams, increasing the number of highly regulated farms by about 600 percent.
- In July 2007, Pennsylvania enacted the Resource Enhancement and Protection Act, which provides tax credits to farmers and businesses to implement conservation practices that reduce pollution.
- Virginia enacted its Water Quality Improvement Act of 1997 establishing the Water Quality Improvement Fund to provide 50 percent of the capital costs to install nutrient removal facilities.
- Pennsylvania and Virginia created nutrient trading programs for their wastewater treatment facilities and, in Pennsylvania, agricultural producers. EPA has assisted the States in developing these programs.
- EPA assisted the States in revising their water quality standards by issuing its April 2003 *Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity, and Chlorophyll a for the Chesapeake Bay and Its Tidal Tributaries*,

and its October 2003 *Technical Support Document for Identification of Chesapeake Bay Designated Uses and Attainability*.

- In 2003, the Chesapeake Executive Council endorsed the water quality criteria and allocations of nutrient and sediment reductions, which served as the basis for expanded tributary strategies in each jurisdiction.
- The Bay States and the District of Columbia have developed tributary strategies that outline how they will develop and implement a series of “best management practices” to minimize pollution.
- In December 2004, EPA Regions 2 and 3 and the Chesapeake Bay jurisdictional partners developed and agreed to the *NPDES Permitting Approach for Discharges of Nutrients in the Chesapeake Bay Watershed* for municipal and industrial wastewater NPDES (National Pollutant Discharge Elimination System) discharge sources. With this approach, EPA and State NPDES permitting authorities agreed to place annual total nitrogen and phosphorus load limits (consistent with the individual State tributary strategies) and monitoring requirements (consistent with Chesapeake Bay nutrient goals) in the permits of all significant dischargers in the Chesapeake Bay watershed. This is particularly noteworthy considering some dischargers are hundreds of miles upstream and may not directly benefit from Bay improvements.
- In September 2006, the EPA OIG found that EPA awarded grants that contributed toward meeting Clean Water Act and *Chesapeake 2000* agreement goals.



With the help of an EPA grant, a bank installed a “green roof” on one of its buildings in Richmond, Virginia. Among its many benefits, the green roof reduces polluted stormwater runoff. (EPA OIG photo).

EPA Can Do More to Assist Bay Partners and Report to Congress on Progress

Despite many noteworthy accomplishments by the Chesapeake Bay partners, the Bay remains degraded. This has resulted in continuing threats to aquatic life and human health, and citizens being deprived of the Bay's full economic and recreational benefits. Through its reporting responsibilities, EPA could better advise Congress and the Chesapeake Bay community that (a) the Bay program is significantly short of its goals and (b) partners now need to make major changes if water quality goals are to be achieved and maintained. Current efforts will not enable the partners to meet their goal of restoring the Bay by 2010, and new challenges are emerging. Bay partners need to address:

- uncontrolled land development
- limited implementation of agricultural conservation practices
- limited control over air emissions affecting Bay water quality

EPA does not have the resources, tools, or authorities to fully address all of these remaining challenges. National farm policy, local land development decisions, and individual life styles have huge impacts on the amount of pollution being discharged to the Bay. EPA needs to further engage local governments and watershed organizations in efforts to clean up the Bay.

More Progress Needed

Even though the area's population has been growing, the Bay Partners have made progress in reducing nutrients and sediments discharged to the Bay. However, at the current rate of reductions, it will take decades to meet the 2010 goals. Based on the 2007 health and restoration assessment in *A Report to the Citizens of The Bay Region* issued by the Chesapeake Bay Program partnership, the Bay partners have achieved 47, 62, and 64 percent of the nitrogen, phosphorus, and sediment loading goals,³ respectively. These decreases are primarily the result of reductions from upgraded wastewater treatment facilities, successful phosphate detergent bans, and use of agricultural best management practices. Based on monitoring data, the U.S. Geological Survey determined that nitrogen and phosphorus concentrations have decreased but not at a rate that would sufficiently reduce nutrient loads to meet the Bay's water quality standards by 2010. In 2007, the Bay partners reported that they were only 21 percent of the way toward meeting the water quality goals, a drop from 23 percent in 2006.

³ Baywide progress may not always reflect individual jurisdiction progress because of differences in programs.



The Blue Plains Wastewater Treatment Plant serves the Washington, DC, metropolitan area and is the largest wastewater treatment facility in the Chesapeake Bay watershed (EPA OIG photo).

EPA used its expertise and regulatory authority to coordinate a major effort by the Bay partners to revise water quality standards and upgrade wastewater treatment facilities. The Bay partners have set a foundation for achieving the nutrient reductions needed from the wastewater sector if implemented as planned. In our January 2008 report, *Despite Progress, EPA Needs to Improve Oversight of Wastewater Upgrades in the Chesapeake Bay Watershed*, we noted that EPA needs to better monitor progress in upgrading wastewater treatment plans to ensure that it is done timely and that reductions are achieved and maintained.

Significant Challenges Remain

The Bay partners need to address current and emerging challenges involving (a) uncontrolled land development, (b) limited implementation of agricultural conservation practices, and (c) limited control over air emissions. In some cases, there are no clear regulatory programs to control the major sources of pollution. Other practices are controversial because they place restrictions on the lives of the residents of the Bay watershed (such as being able to build additions to existing houses or develop vacant land). It will be difficult to address these challenges. Even where cost effective practices exist, implementation may only be voluntary and thus limited.

Also, consistent and sustained funding sources have not been identified to meet all the Bay's needs. The Bay clean-up is expensive, and the key funding source is the public through increased taxes and fees. In October 2004, CBPO estimated the remaining capital costs for implementing tributary strategies to be \$28 billion. The public may resist incurring these costs. For example, some municipalities are suing the Pennsylvania Department of Environmental Protection over stricter wastewater treatment facility discharge limits. To reach these limits, most facilities will need to install nutrient removal technology funded by increased user fees. Therefore, through reports and other forms of outreach, Bay partners need to help the Bay citizens appreciate the importance of their investment for achieving water quality standards in local waters as well as the Bay.

EPA Can Better Assist Local Communities in Managing Growth

New development is increasing nutrient and sediment loads at rates faster than restoration efforts are reducing them. Further, while developed lands contribute less than one-third of the Bay loads, they are expected to require about two-thirds of the overall estimated restoration costs. We discuss these issues in our report *Development Growth Outpacing Progress in Watershed Efforts to Restore the Chesapeake Bay*, issued September 10, 2007.

The key decision-makers in how the Chesapeake Bay watershed develops will be the local governments and citizens, not EPA. However, “smart growth” techniques can be a cost-effective way for communities to manage new development, and EPA should encourage such growth. Communities could incorporate smart growth practices into local codes and regulations.



Suburban growth encroaching on farmlands is a key issue in the Chesapeake Bay watershed that requires “smart growth” techniques (photo courtesy Chesapeake Bay Program).

While smart growth practices can lessen development impact, they do not eliminate it. EPA needs to engage the States and local governments to agree to a strategy on how communities in the Bay watershed will develop and improve water quality. Such a strategy should identify actions needed, responsible action officials, and funding. In our September 2007 report, we recommended that EPA develop such a strategy and include local governments in planning. EPA concurred with the recommendations. EPA can also impact local decision making by establishing a strong stormwater permit program, and sharing knowledge on smart growth best management practices. In its annual reporting, EPA should identify the economic and social challenges that the partners and local governments are facing in managing development so that citizens and political leaders will be able to make informed decisions about meeting the challenges.

Agricultural Producers Need to Significantly Increase Conservation Practices Protecting Water Quality

The Federal Government needs to establish a coherent national policy that helps agricultural producers be protective of water quality while remaining profitable. The agricultural sector is the single largest contributor of the pollutants harming the Bay. Based on 2007 data, 65 per cent of nitrogen, 60 percent of phosphorus, and 86 percent of sediment reductions needed to meet reduction goals are expected to come from agriculture. The U.S. Department of Agriculture (USDA), a Bay partner, provides leadership on agricultural and conservation practices. In our report on agricultural practices, *Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources*, issued jointly on November 20, 2006, with the USDA OIG, we reported that few of the agricultural practices were reported to have been implemented, based on 2004 data. According to the 2007 estimates calculated by the Chesapeake Bay Program’s watershed model, less pollution is coming from the agricultural sector but the reduction is not enough to meet the water quality goal.

Agricultural pollution can be controlled through regulation or incentives. However, EPA's regulatory authority and financial aid for agriculture is limited. EPA is only allowed to regulate concentrated animal feeding operations that



Wastewater and rainwater from an area where dairy cows are housed flow to the drain (center of photo), which is directed to a storage tank (EPA OIG photo).

discharge into the Nation's waters, but EPA was unable to provide us with information on how many farms or how much pollution is under EPA regulatory control in the Chesapeake Bay watershed. Nationwide, EPA estimates that only about 5 percent of animal feeding operations are regulated; the balance operate under voluntary programs.

EPA provides a small amount of incentive funding to agricultural producers, usually just for one-time demonstration projects. USDA provides substantially more financial funding plus technical assistance. For example, from 2003 to 2005, EPA awarded approximately \$11 million from its nonpoint source program

for agricultural projects statewide in Maryland, Pennsylvania, and Virginia. For the same period and scope, USDA provided over \$250 million for conservation practices. Regardless, current budgets cannot fill the demand for assistance programs, making it difficult to expand incentives for agricultural producers.

Even though USDA has been encouraging science-based conservation practices in the region for years, it has not significantly adapted its strategies to meet the specific needs of the Chesapeake Bay. Many agricultural conservation practices must be implemented on a consistent basis to improve water quality, and substantial, long-term financial commitments will be needed.

Some in the agricultural community believe they have been unfairly stigmatized as the "villain" in contributing to the Bay's pollution. USDA staff questioned the accuracy of the Chesapeake Bay Program's Phase 4.3 watershed model estimates of how much pollution is coming from the agricultural sector. Obtaining sufficient data on the actual extent and success of agricultural conservation estimates has been limited. The Bay partners need to work with USDA and the agricultural community to develop a better reporting and measurement system.

Bay partners have recently identified the emerging biofuel industry as another challenge to reducing nutrients from the agricultural sector. To lessen dependence on imported oil and reduce green-house gases, the Nation is exploring homegrown renewable fuels. With its proximity to oil refineries and rising corn prices, agricultural producers in the Chesapeake Bay region may decide to expand their acreage devoted to corn – the primary source for grain-based ethanol. The Chesapeake Bay Commission estimated that Bay area agricultural producers

growing corn to support the emerging ethanol industry could introduce as much as an additional 5 million pounds of nitrogen per year to the Bay.

Further Reductions in Air Emissions Can Help Restore the Bay

Although EPA has several actions underway to reduce nitrogen oxide (NO_x) emissions under the Clean Air Act, atmospheric deposition continues to be a significant contributor to the Bay's overall nitrogen loads. Air deposition accounts for about a quarter to a third of the nitrogen loads to the Bay. CBPO is relying on anticipated nitrogen deposition reductions from Clean Air Act regulations already issued by EPA, combined with anticipated reductions from other non-air sources, to meet water quality goals for the Bay watershed. Details are in our prior report, *EPA Relying on Clean Air Act Regulations to Reduce Atmospheric Deposition to the Chesapeake Bay and its Watershed*, issued February 28, 2007.



Cargo ships contribute to air deposition (photo courtesy Chesapeake Bay Program).

Emerging Challenge of Increasing NO_x Emissions from Shipping

Shipping traffic on the East Coast has continued to become increasingly heavy since 2004, and will become more so after expansion of the Panama Canal is completed (scheduled for 2014). The Virginia Port Authority forecasts that the Port of Hampton Roads (which includes Norfolk International Terminal, Newport News Marine Terminal, Portsmouth Marine Terminal, and the Craney Island Terminal) will grow approximately 400 percent from 2005 to 2040. The increase in traffic is projected to result in an estimated 14,100 tons of additional NO_x air emissions annually by 2040. This amounts to about 14 percent of the nitrogen that EPA had projected to be emitted from all sources within the entire airshed in 2010.

The NO_x emissions that contribute nitrogen deposition to the Bay and its watershed come from States both inside and outside the watershed. This geographical area is referred to as the airshed.⁴ Because non-air sectors have not reduced their nitrogen loads as planned, additional reductions in air emissions and its resulting atmospheric deposition may be needed. Two Clean Air Act-related actions could have an impact. EPA recently lowered its 8-hour ozone standard, which could require nonattainment areas to make additional reductions in NO_x emissions. Also, EPA is reviewing its secondary standard for nitrogen dioxide (NO₂); if EPA tightens this standard, States may need to further reduce NO_x emissions. Absent these two actions, any additional NO_x reductions would likely have to be State-initiated.

We identified several opportunities for reducing mobile source emissions, the predominant source of atmospheric deposition to the Bay, which would not require additional Clean Air Act regulations or revisions. Some of these actions are voluntary initiatives while others would require State regulatory action. These initiatives can be controversial

⁴ EPA defines the Bay airshed as the area where nitrogen emission sources are estimated to cumulatively contribute 75 percent of the total nitrogen deposition to the Bay and its surrounding watershed.

(e.g., adopting Low Emitting Vehicle standards) or difficult to implement (e.g., voluntary programs). Consequently, States may be reluctant to take such initiatives, particularly those outside the Bay watershed. These actions are discussed further in Appendix F.

Under the Clean Air Act, EPA has set primary and secondary air quality standards for six pollutants, including ozone and NO_2 . Because NO_x is a critical ingredient to the formation of ozone,⁵ EPA and Bay partner States have undertaken numerous efforts to reduce NO_x emissions, including emissions standards for motor vehicles (e.g., the Tier 2 program and Clean Air Nonroad Diesel Rule), emissions standards for electric utilities, and the NO_x Transport Rule. CBPO is relying on these anticipated nitrogen deposition reductions to meet Bay goals.



Automobile exhaust can contribute significant amounts of nitrogen to the Chesapeake Bay through air deposition (photo courtesy Chesapeake Bay Program).

Further reductions in NO_x emissions may be required depending upon the result of the EPA Office of Air and Radiation's review of the current secondary National Ambient Air Quality Standards for NO_2 .⁶ The secondary standards are to protect the public welfare from any known or anticipated adverse effects from pollutants in ambient air, including to the Bay. Accordingly, this review plans to consider the impact of these emissions on the Chesapeake Bay. As part of its review of the NO_2 secondary standard, EPA may consider the impact of other reactive forms of nitrogen, such as ammonia. Our prior report on air deposition in the Bay reported that ammonia emissions from animal feeding operations represent a potentially significant uncontrolled contributor of nitrogen loads to the Bay. The impact of ammonia emissions on algal blooms is more significant than NO_x because ammonia/ammonium is the preferred form of nitrogen. A more stringent secondary standard for NO_2 could result in additional controls to reduce NO_x emissions that would help reduce nitrogen deposition in the Bay. CBPO should have the opportunity to review and comment on any proposed rulemaking resulting from EPA's review because of the potential impact that revision of the secondary standard for NO_2 could have on the Bay.

EPA Needs to Better Use Its Reporting Powers to Inform Congress and Bay Citizens of Program Challenges

Congress and Bay citizens need to be provided with a realistic picture of what it will take to clean the Bay and when the water quality goals will be achieved.

⁵ Nitrogen oxides react with volatile organic compounds in the presence of sunlight to form ground-level ozone.

⁶ NO_2 represents the specific air quality indicator that the standard measures. However, EPA considers the impact of oxides of nitrogen in setting the standard.

Such information is needed so that informed decisions on funding and policy can be made. However, neither EPA's report to Congress nor the Bay partners' annual report provide complete information on Bay activities and challenges. The reporting process provides for disclosing progress, impediments, and recommendations for achieving desired outcomes. CBPO should work with its partners to determine appropriate mechanisms for reporting. This should include funding gaps, the status of wastewater treatment facility construction, local regulatory issues, and other impediments to cleaning up the Bay. By improving the information it shares with Congress and the public and further leveraging partner resources, EPA can go a long way in bringing about the changes needed to achieve the goals desired by the Chesapeake Bay watershed stakeholders.

The Clean Water Act requires the EPA Administrator to report to Congress every 5 years on the state of the Bay and to make recommendations for improvement. EPA's CBPO did not effectively use its first Chesapeake Bay 5-year report, issued in 2003, to make recommendations for improved management strategies. CBPO missed the opportunity to inform Congress of higher-level challenges, delaying the success of the program. Although CBPO was drafting a 2008 report during our review, it did not make that report available to us to review.

Congress' requirement for the 5-year report also directs that the information be presented in such a format as to be readily transferable to and useable by other watersheds. Congress provides CBPO with the highest level of funding among all the great waters programs. CBPO needs to ensure that other estuary programs can benefit from the Chesapeake Bay. For example, CBPO and its Bay partners have created an NPDES strategy, providing a scientific and regulatory structure for the wastewater treatment sector, which other watersheds may wish to follow. Nutrient overloading from wastewater treatment facilities is a common problem experienced by other watersheds across the Nation.

The Chesapeake Bay partners also issue an annual Bay Health and Restoration report. While this report provides progress in meeting the water quality goals, it does not provide a complete picture of progress made. It does not indicate what steps are needed for each sector to achieve its targets. As a result, readers do not know the likelihood of these sectors achieving the remainder of their goals or how this affects achieving overall water quality goals. For example, the Bay partners reported in 2006 that, since 1985, the agriculture sector is at the half-way mark for meeting its nutrient reduction goals and two-fifths toward meeting its sediment goal, and notes significant funding and technical assistance will be needed. However, the report did not identify how the funding or assistance would be obtained, or what the impact would be if the funding and assistance were not obtained. Bay experts have stated that the "easy fixes" have been done, leaving more difficult challenges to be addressed.

The Chesapeake Bay Program has been under much scrutiny by the EPA OIG and other organizations to determine if reported progress was accurately portrayed. In

2005, the Government Accountability Office recommended that CBPO (1) complete its efforts to develop and implement an integrated assessment approach; (2) revise its reporting approach to improve the effectiveness and credibility of its reports; and (3) develop a comprehensive, coordinated implementation strategy that takes into account available resources. The Senate and House Appropriations Committee withheld \$5 million in administrative funds until EPA implements these recommendations. CBPO was further directed by Congress to develop a Chesapeake Bay action plan for the remaining years of the *Chesapeake 2000* agreement. The Bay partners have drafted the Chesapeake Action Plan, which is described as integrating all of the Bay program's partnership activities into a realistic plan that targets resources to ensure that the most effective and realistic work plans are developed and implemented. The draft plan includes actions for other federal and State agencies and some watershed organizations. This plan, which CBPO had planned to submit to Congress by June 20, 2008, was not available for our review during our evaluation.

EPA's regulatory authority is limited by statute, but it can address some of its limitations by capitalizing on the resources, tools, and authorities of its partners. EPA has developed a relationship with the "signatory" States. However, EPA needs to do more to assure that local governments and watershed organizations are also active partners. EPA should work with local governments and watershed organizations to identify effective and realistic practices for these partners to implement. Successful key actions could be embodied in the Chesapeake Action Plan.



The sun setting over St. Mary's River in Maryland (photo courtesy National Oceanic and Atmospheric Administration).

Recommendations

In prior reports, the EPA OIG made recommendations to the Region 3 Regional Administrator to address individual sector needs (agricultural, developing lands, air deposition, and wastewater). Appendix D provides specifics. We are addressing this summary report to the EPA Administrator because EPA's implementation of all the previously issued recommendations alone cannot ensure that the Bay partners will achieve their water quality goals. Other federal agencies and State and local governments have responsibilities to clean up the Bay, and without their active involvement restoration cannot succeed. Also, the success of the Chesapeake Bay restoration is critical for estuaries across the country experiencing similar issues.

Specifically, we recommend that the EPA Administrator:

1. Improve reporting to Congress and the public on the actual state of the Chesapeake Bay and actions necessary to improve its health by including the following information in an appropriate report:
 - Activities and resources necessary to accomplish the *Chesapeake 2000* agreement goals;
 - Activities that are not supported with funding or a commitment from the responsible federal, State, or local government;
 - Challenges significantly hindering the Bay partners in adequately reducing nutrients and sediment;
 - Milestones for generating funding and accomplishing activities; and
 - Impact on the health of the Bay if milestones are not accomplished.
2. Develop a strategy to further engage local governments and watershed organizations to capitalize on their resources, tools, authorities, and information to advance the mission of the Chesapeake Bay and include key actions as developed into the Chesapeake Action Plan.
3. Provide CBPO with the opportunity to review and comment on any proposed rulemakings resulting from the Office of Air and Radiation's review of the secondary standard for NO₂.

Agency Response and OIG Comments

The Agency concurred with the recommendations in this report. A complete copy of the Agency's response is in Appendix G. These recommendations will remain open until the Agency has completed the agreed-upon actions.

Status of Recommendations and Potential Monetary Benefits

RECOMMENDATIONS						POTENTIAL MONETARY BENEFITS (in \$000s)	
Rec. No.	Page No.	Subject	Status ¹	Action Official	Planned Completion Date	Claimed Amount	Agreed To Amount
1	16	Improve reporting to Congress and the public on the actual state of the Chesapeake Bay and actions necessary to improve its health by including the following information in an appropriate report: <ul style="list-style-type: none"> • Activities and resources necessary to accomplish the <i>Chesapeake 2000</i> agreement goals; • Activities that are not supported with funding or a commitment from the responsible federal, State, or local government; • Challenges significantly hindering the Bay partners in adequately reducing nutrients and sediment; • Milestones for generating funding and accomplishing activities; and • Impact on the health of the Bay if milestones are not accomplished. 	O	EPA Administrator			
2	16	Develop a strategy to further engage local governments and watershed organizations to capitalize on their resources, tools, authorities, and information to advance the mission of the Chesapeake Bay and include key actions as developed into the Chesapeake Action Plan.	O	EPA Administrator			
3	16	Provide CBPO with the opportunity to review and comment on any proposed rulemakings resulting from the Office of Air and Radiation's review of the secondary standard for NO ₂ .	O	EPA Administrator			

¹ O = recommendation is open with agreed-to corrective actions pending
 C = recommendation is closed with all agreed-to actions completed
 U = recommendation is undecided with resolution efforts in progress

Appendix A***Scope and Methodology***

We performed this review in accordance with generally accepted government auditing standards issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We conducted our field work from May 2005 through February 2008 for all our assignments. We conducted our work at EPA Region 3's headquarters office in Philadelphia, Pennsylvania, and its CBPO office in Annapolis, Maryland. We also did work at EPA's National Exposure Research Laboratory in Research Triangle Park, North Carolina. Further, we did work with USDA, signatory State offices, selected municipalities, and selected agricultural operations. We interviewed staff at these locations. We also interviewed experts from academia and other fields involved in the Chesapeake Bay restoration. We limited our evaluation to efforts by the signatory jurisdictions of the District of Columbia, Maryland, Pennsylvania, and Virginia.

We reviewed the activities the Bay partners had taken since signing the *Chesapeake 2000* agreement through 2007. We reviewed the *Chesapeake 2000* agreement, State tributary strategies, available implementation plans, data from the Chesapeake Bay Program watershed model v.4.3 and point source data base, and other related documents. We reviewed the progress the Chesapeake Bay Program partners had been making in achieving water quality standards by reducing nutrients and sediments from 1985 to 2007 using the following:

- estimated loading data from 1985 to 2007 from the Bay's watershed model v. 4.3,
- reported data from the CBPO Point Source Data Base,
- 2006 and 2007 Chesapeake Bay *Health and Restoration Assessment* issued by Bay partners,
- *Synthesis of U.S. Geological Survey Science for the Chesapeake Bay Ecosystem and Implications for Environmental Management*.

We determined that the CBPO had established data quality standards for its v.4.3 watershed model; we did not assess the accuracy of the data input into the model. The only point sources reviewed were the wastewater treatment facilities and municipal separate storm sewer systems; we did not conduct a review of concentrated animal feeding operation point sources.

We obtained an understanding of the controls EPA has in place to report on the progress the Bay partners are making in reducing nutrients and sediments by sector. The Bay partners are relying on federal, State, and local government regulations and voluntary actions.

Details on prior audit coverage are in Appendices B through D.

Appendix B

Prior Reports

Four Prior EPA OIG Reports Issued in Response to Request		
Title	Report No.	Date
Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources <i>(issued jointly with USDA OIG)</i>	2007-P-00004	November 20, 2006
EPA Relying on Existing Clean Air Act Regulations to Reduce Atmospheric Deposition to the Chesapeake Bay and its Watershed	2007-P-00009	February 28, 2007
Development Growth Outpacing Progress in Watershed Efforts to Restore the Chesapeake Bay	2007-P-00031	September 10, 2007
Despite Progress, EPA Needs to Improve Oversight of Wastewater Upgrades in the Chesapeake Bay Watershed	08-P-0049	January 8, 2008

Additional EPA OIG Reports on Chesapeake Bay		
Title	Report No.	Date
EPA Grants Supported Restoring the Chesapeake Bay	2006-P-00032	September 6, 2006
Federal Facilities in Chesapeake Bay Watershed Generally Comply with Major Clean Water Act Permits	2007-P-00032	September 5, 2007

Other Notable Chesapeake Bay Reports (Not by EPA OIG)		
Title	Report No.	Date
Government Accountability Office Report, <i>Chesapeake Bay Program: Improved Strategies Are Needed to Better Assess, Report, and Manage Restoration Progress</i>	GAO-06-96	October 2005
National Academy of Public Administration Report: <i>Taking Environmental Protection to the Next Level: An Assessment of the U.S. Environmental Delivery System</i>	Academy Project No: 2048	April 2007

Appendix C

Summaries of Prior EPA OIG Reports

Summaries of Four Prior Reports Issued in Response to Request

Below are summaries on the four reports we have already published in response to the congressional request by Senator Mikulski. Appendix D lists all of the recommendations and the status on each.

Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources

**2007-P-00004
November 20, 2006**

State-level partners have committed the agricultural community to making nutrient reductions, but numerous practices abound and are generally performed on a voluntary basis. Few of the agricultural practices in the tributary strategies have been implemented because the agricultural community considers many of these practices as either being unprofitable or requiring significant changes in farming techniques. Although the State-level partners have provided substantial funding to implement these practices, one of the key State partners acknowledged substantial additional funding is still needed. At the federal level, applications for USDA's technical and financial assistance programs went unfunded, making it difficult to expand incentives for Bay area agricultural producers.

EPA must improve its coordination and collaboration with its Bay partners and the agricultural community to better reduce nutrients and sediment entering the Chesapeake Bay watershed. However, members of the agricultural community have been reluctant to participate with EPA because of EPA's regulatory enforcement role. USDA, a Bay partner at the federal level, could significantly assist EPA in implementing the needed conservation practices within the agricultural community, given its many conservation programs, extensive field organization, and long experience working with the agricultural community. However, USDA has not coordinated a Department-wide strategy or policy to address its commitment as a Bay partner.

EPA Relying on Clean Air Act Regulations to Reduce Atmospheric Deposition to the Chesapeake Bay and Its Watershed

**2007-P-00009
February 28, 2007**

CBPO is relying on anticipated nitrogen deposition reductions from Clean Air Act regulations already issued by EPA, combined with anticipated reductions from other non-air sources, to meet water quality goals for the Bay watershed. EPA believes these activities will provide sufficient nitrogen deposition reduction to enable the Bay to meet its overall nitrogen cap load, assuming non-air activities achieve planned reductions. EPA estimates that Clean Air Act regulations already issued will reduce nitrogen that falls directly into the Bay, as well as nitrogen deposited to the Bay watershed, by

19.6 million pounds annually by 2010. Even greater reductions should occur as States undertake additional measures in the next few years to meet the ozone and fine particulate matter standards. State and EPA strategies do not include additional air reduction activities specifically designed to clean up the Bay, although many State activities should have the co-benefit of reducing nitrogen deposition in the Bay.

If additional reductions in air emissions are needed to clean up the Bay, one potentially significant source of deposition not currently controlled is ammonia emissions from animal feeding operations. The magnitude of these emissions to nitrogen deposition in the Bay is uncertain. Ammonia emissions monitoring of animal feeding operations, expected to begin in the spring or early summer of 2008, should provide data to help EPA better determine the amount of such emissions from farming operations.

Development Growth Outpacing Progress in Watershed Efforts to Restore the Chesapeake Bay

**2007-P-00031
September 10, 2007**

EPA and its Chesapeake Bay watershed partners will not meet load reduction goals for developed lands by 2010 as established in the *Chesapeake 2000* agreement. In fact, new development is increasing nutrient and sediment loads at rates faster than restoration efforts are reducing them. Developed lands contribute less than one-third of the Bay loads but would require about two-thirds of the overall estimated restoration costs. Consequently, EPA and its Bay partners focused on more cost-effective approaches, such as upgrading wastewater facilities and implementing agricultural best practices. Additional challenges impeding progress include:

- Lack of community-level loading caps.
- Shortage of up-to-date information on development patterns.
- Ineffective use of regulatory programs to achieve reductions.
- Limited information and guidance on planning and applying environmentally sensitive development practices.
- Limited funding available for costly practices.

A cost-effective start to reversing the trend of increasing loads from developed land is for communities to concentrate on new development. Opportunities abound for EPA to show greater leadership in identifying practices that result in no-net increases in nutrient and sediment loads from new development and assisting communities in implementing these practices. If communities do not sufficiently address runoff from new development, loads from developed lands will continue to increase rather than diminish.

Despite Progress, EPA Needs to Improve Oversight of Wastewater Upgrades in the Chesapeake Bay Watershed

**08-P-0049
January 8, 2008**

Chesapeake Bay wastewater treatment facilities risk not meeting the 2010 deadline for nutrient reductions if key facilities are not upgraded in time. In the 7 years since signing the *Chesapeake 2000* agreement, EPA and its State partners have taken a number of steps

to lay the foundation for achieving the 2010 wastewater nutrient reduction goals. Water quality standards have been set, nutrient loadings have been allocated, and nutrient limits are beginning to be incorporated into permits. However, States need to finish adding nutrient limits to the permits, and the facilities will need to make significant reductions by 2010. Crucially, these reductions will need to be maintained once achieved. Significant challenges include generating sufficient funding and addressing continuing population growth. EPA needs to better monitor progress to ensure needed upgrades occur on time and loading reductions are achieved and maintained. Otherwise, Bay waters will continue to be impaired.

Summaries of Two Additional Reports Involving Chesapeake Bay

EPA Grants Supported Restoring the Chesapeake Bay

2006-P-00032
September 6, 2006

EPA awarded assistance agreements (grants) that contributed toward meeting the goals of the Clean Water Act and the *Chesapeake 2000* agreement. These grants funded activities designed primarily to: reduce the nutrients and sediment entering the Bay and its tributaries, monitor ongoing efforts to restore Bay water quality, and model (estimate) the results of Bay implementation strategies. In Fiscal Years 2003, 2004, and 2005, Congress appropriated \$23 million each year for EPA's Chesapeake Bay Program. In each of those years, EPA awarded about \$8 million for State implementation grants and \$7 million for technical and other grants for specific projects. EPA used the remaining \$8 million to fund EPA personnel and office management, interagency agreements, and congressional earmarks. The efforts contributed to EPA's overall Bay restoration program. This report did not contain recommendations.

Federal Facilities in Chesapeake Bay Watershed Generally Comply with Major Clean Water Act Permits

2007-P-00032
September 5, 2007

Overall, EPA and the States are doing well managing how major federal facilities comply with their NPDES permits. In EPA's last reporting period (2004), major federal facilities in the Chesapeake Bay watershed had a lower rate of Significant Noncompliance than other federal and non-federal major-permit facilities nationwide. EPA and States have a variety of formal and informal tools available to enforce federal facility compliance with NPDES permits. These tools included: multimedia, voluntary agreement, and media press release approaches; Notices of Violation; an administrative order; and a Federal Facility Compliance Agreement. Also, EPA developed the Wastewater Integrated Strategy, which seeks to eliminate federal facility Significant Noncompliance with NPDES permit limits. EPA also worked with the Department of Defense to make NPDES permit compliance a higher priority at military installations (eight of the nine federal facilities with major NPDES permits are at military installations). We made no recommendations in this report.

Status of Recommendations for Prior EPA OIG Reports

**Saving the Chesapeake Bay Watershed Requires Better
Coordination of Environmental and Agricultural Resources**

**2007-P-00004
November 20, 2006**

The OIG has accepted EPA's corrective action plan for all recommendations.

Recommendation 1: We recommend that the EPA Administrator propose executing a Memorandum of Agreement with the USDA to assist the Bay partners in meeting their nutrient reduction goals by:

- a. Identifying conservation practices USDA will promote with either technical assistance or cost-share programs.
- b. Developing procedures for promoting and fast-tracking alternative practices for cost-share programs and technical assistance.
- c. Establishing a task force to identify how USDA cost-share programs can better assist the States in carrying out their tributary strategies.
- d. Establishing demonstration projects to emphasize producer benefits, not just environmental benefits of best management practices in tributary strategies.
- e. Conducting research to quantify accurately the nutrient load reductions from alternative best management practice strategies to ensure these practices are the best for removing nutrients and to improve the models.
- f. Developing a tracking system to determine a more accurate picture of the agricultural community's commitment to implementing the tributary strategies.

Status: Completed. On May 9, 2007, EPA and USDA agreed to a Memorandum of Understanding to carry out activities to help Chesapeake Bay Program partners meet their nutrient reduction goals.

Recommendation 2: We recommend that the EPA Region 3 Regional Administrator instruct EPA/CBPO to work with USDA, the States, local governments, land grant universities, and agricultural organizations to revisit State tributary strategies to ensure that the mix of best management practices chosen are those most suitable to the area, have the greatest potential for implementation, and can effectively reduce nutrient and sediment loss.

Status: Task ongoing. As of March 9, 2007, EPA plans to actively participate in USDA priority-setting activities and program guidance forums to advance the Bay Program nutrient reduction priorities. The Nutrient Subcommittee and its Agricultural Nutrient Reduction Workgroup is critically evaluating cost-effective practices and developing a plan for how to accelerate implementation of these practices. EPA is working to finalize the Chesapeake Bay Watershed Model (Phase

5.0). EPA has funded the Cooperative State Research, Education, and Extension Service Mid-Atlantic Regional Water Program to improve the description of pollutant removal efficiencies of agricultural best management practices. Several Bay States are using nutrient trading as a tool to help meet Chesapeake Bay water quality goals.

Recommendation 3: We recommend that the EPA Region 3 Regional Administrator instruct EPA/CBPO to include development of implementation plans as a special condition in Chesapeake Bay Program grant agreements for States that have not submitted an implementation plan.

Status: Completed. In the 2007 Grant Guidance, EPA requires that any signatory jurisdiction or headwater State that does not have an approved Tributary Strategy implementation plan work directly with its Project Officer to assure that any missing elements of Tributary Strategy implementation plans are incorporated into its Work Plan.

***NOTE:** The four following recommendations were made to USDA for which the USDA OIG is conducting the audit follow-up.*

USDA OIG has accepted USDA's corrective action plan for all recommendations.

Recommendation 4: We recommended that the USDA Secretary or Deputy Secretary assign a senior level Departmental official to coordinate USDA goals and programs with EPA and the Chesapeake Bay Program. Delegate to that official authority to direct and coordinate goals and programs across USDA mission areas and agencies and to monitor USDA actions to meet the Chesapeake Bay Program goals.

Status: Completed. On February 18, 2007, USDA Secretary Mike Johanns designated the Under Secretary, Natural Resources and Environment (NRE), as the USDA official responsible for coordinating USDA program activities and initiatives with the Environmental Protection Agency, its Chesapeake Bay Program Office, and others that have an interest in restoring the Chesapeake Bay. This designated official will also provide the leadership necessary to monitor USDA actions and results in meeting mutual goals and objectives of the Bay, as well as provide periodic briefings regarding USDA's coordinated efforts.

Recommendation 5: We recommended that the USDA Secretary or Deputy Secretary review the feasibility of targeting or redirecting USDA funds (or allocating USDA funds) on a regional and/or geographical basis to coordinate with the environmental restoration of the Chesapeake Bay, including the possibility of linking the availability of financial and technical assistance to proximity to the Chesapeake Bay watershed.

Status: Completed. On March 11, 2008, NRCS, as the lead agency for NRE, achieved final action when it provided evidence that USDA had reviewed the feasibility of targeting or redirecting USDA funds (or allocating USDA funds) on a regional and/or geographical basis to coordinate with the environmental restoration of the Chesapeake Bay, including the possibility of linking the availability of financial

and technical assistance to proximity to the Chesapeake Bay. An independent third party contactor, selected competitively to examine the efficacy of its program allocation formula, concluded that NRCS needs to (1) develop better outcome based performance information and integrate the information into its allocation formulas; (2) improve the analytical soundness of the allocation models, factors, weights and data particularly through the elimination of redundant factors; and (3) improve the transparency of the budget allocation formula. The contractor's report also recommended that NRCS minimize the use of factors which are not related to performance. The prime example of this is the use of base factors which attempt to define the landmass being addressed by the program. (i.e., NRCS should avoid targeting or redirecting funds on a regional and/or geographical basis.)

Recommendation 6: We recommended that the USDA Secretary or Deputy Secretary direct USDA agencies to expedite the development and implementation of outcome-based performance measurements for evaluating the effectiveness of their conservation efforts and programs.

Status: Task ongoing. In its October 12, 2006 response, NRCS, as lead agency for NRE, stated it has directed USDA agencies to expedite the development and implementation of outcome-based performance measurements through the Conservation Effects Assessment Project (CEAP), a significant multi-agency effort designed to quantify the benefits of conservation practices implemented by private landowners participating in selected USDA conservation programs. The agencies expect that CEAP will provide much needed data, methods, and information to improve measurement of program performance, and will also assist in development of improved measures that better reflect desired environmental outcomes. NRCS' leadership is scheduled to meet again by June 2008 to assess the direction needed to accomplish the recommendation.

Recommendation 7: We recommended that the USDA NRCS Chief develop a tracking system for maintaining a list of technical assistance and financial assistance requests from landowners and agricultural producers that cannot be completed due to limited funding.

Status: Task ongoing. In its October 12, 2006 response, NRCS agreed to develop a tracking system for technical assistance requests. In January 2008, NRCS advised it no longer intends to develop a tracking system for technical assistance requests. Instead, NRCS will seek a change in management decision (a new corrective action plan) and request final action. NRCS stated it is developing of a new agency-wide tracking system for all its program activity. The creation of an interim process to track unfunded technical and financial assistance requests is no longer a prudent use of limited resources. NRCS leadership is scheduled to meet again by June 2008 to assess the direction needed to accomplish the recommendation.

EPA Relying on Clean Air Act Regulations to Reduce Atmospheric Deposition to the Chesapeake Bay and Its Watershed

**2007-P-00009
February 28, 2007**

The OIG has accepted EPA's corrective action plan for the recommendation.

Recommendation 1: We recommend that the EPA Region 3 Regional Administrator instruct CBPO to use the results of the animal feeding operations emissions monitoring studies to determine what actions and strategies are warranted to address animal feeding operations' nitrogen deposition to the Chesapeake Bay.

Status: Task ongoing. CBPO and its partners continue to use the results of the Community Multiscale Air Quality Model to factor in the estimated water quality benefits of Clean Air Act regulations within the development of the Chesapeake Bay watershed TMDL currently underway. The Mid-Atlantic Water Quality Program has completed development of best management practices and efficiencies for application to animal feeding operations that will yield reductions in ammonia emissions. These BMPs and efficiencies are currently undergoing review through the Chesapeake Bay Program's Nutrient Subcommittee and technical workgroup prior to submission to the Program's Water Quality Steering Committee for final approval for application by the watershed partners.

Development Growth Outpacing Progress in Watershed Efforts to Restore the Chesapeake Bay

**2007-P-00031
September 10, 2007**

The OIG has accepted EPA's corrective action plan for all recommendations.

Recommendation 2-1: We recommend that the EPA Region 3 Regional Administrator charge the CBPO Director to prepare and implement a strategy that demonstrates leadership in reversing the trend of increasing nutrient and sediment loads from developed and developing lands. Such a strategy should include steps to:

- develop a set of Environmentally Sensitive Development practices that result in no-net increase in nutrient and sediment loads and flows in new developments and may be applicable to existing development and redevelopment;
- work with State and local partners, developers, federal agencies, and other stakeholders to implement these practices through regulatory, voluntary, and incentive approaches;
- educate municipal officials on these practices and other aspects of Environmentally Sensitive Development;
- target technical assistance to local governments interested in pursuing tools and strategies for reducing runoff from development;
- identify progressive local governments and leaders in the housing and commercial development fields and create forums for sharing information;
- report on progress through the existing annual reporting structure; and
- evaluate the effectiveness of the strategy.

Status: Task ongoing. CBPO has agreed to formulate a strategy for developed and developing lands by September 10, 2008. Also, CBPO, will issue an annual report on progress toward reducing nutrient and sediment loads from developed and developing lands, starting in September 2009.

Recommendation 2-2: We recommend that the EPA Region 3 Regional Administrator charge the CBPO Director to work with the Chesapeake Bay partners to set realistic, community-level goals for reducing nutrient and sediment loads from developed and developing lands.

Status: Task ongoing. By March 2009, EPA and State partners will begin to reach agreement on needed changes to Bay-wide caps and allocate those caps by tributary. By July 2010, EPA will confirm that the individual jurisdictional allocation and implementation strategies that States will develop will result in achievement of Chesapeake Bay water quality standards. These allocations will be reflected in the draft watershed TMDL expected to be published in 2011.

Recommendation 2-3: We recommend that the EPA Region 3 Regional Administrator charge the Water Protection Division Director to establish, with the delegated States, a documented permitting approach that achieves greater nutrient and sediment reductions in municipal separate storm sewer system permits across the watershed by:

- incorporating measurable outcomes in line with waste load allocations, when established for local waters and the Chesapeake Bay, through the TMDL regulatory program;
- including retrofitting of developed areas where these actions would benefit local waters as well as the Bay; and
- disallowing increases in loads and flows.

Status: Task ongoing. EPA has agreed to develop a technical support document to establish common expectations with respect to the municipal separate storm sewer system program for permit writers and the regulated community by April 2008. EPA will establish a permitting approach with States by October 2008.

Despite Progress, EPA Needs to Improve Oversight of Wastewater Upgrades in the Chesapeake Bay Watershed

**08-P-0049
January 8, 2008**

The OIG has accepted EPA's corrective action plan for recommendations 2-1 thru 2-5. The OIG's acceptance of Recommendation 3-1 is pending EPA's submission of dates when proposed actions will be completed.

Recommendation 2-1: We recommend that the EPA Region 3 Regional Administrator instruct staff to review and comment on State-drafted NPDES permits for significant facilities to ensure that interim construction milestones are included in compliance schedules longer than 1 year to meet the Chesapeake Bay allocations. The milestones should include:

- design construction
- construction start
- construction completion
- compliance with permit limits

Status: Task ongoing. EPA will continue to review and comment on State-drafted NPDES permits for significant facilities. EPA will assure that milestones are in place if the compliance schedule to achieve the permit limit exceeds 1 year. EPA will seek to include the following milestones, as appropriate in the permits: design completion, construction start, construction completion, and compliance with permit limits.

Recommendation 2-2: We recommend that the EPA Region 3 Regional Administrator instruct staff to obtain from NPDES-authorized States information on progress in achieving the milestones above the “select priority facilities.” Such priority facilities include those that are identified as needing the largest nutrient reductions and are identified by the States as missing the interim milestones noted in Recommendation 2-1. If milestones are missed, EPA will work with the States to take appropriate follow-up action to ensure compliance with the milestones.

Status: Task ongoing. By October 1, 2008, EPA will:

- Initiate milestone tracking for 10 designated priority facilities. These priority facilities are estimated to achieve about 75 percent of the total nitrogen reductions and about 50 percent of the phosphorus reductions planned for significant facilities.
- Identify interim milestones for each design completion, construction start, construction completion, and compliance with permit limits.

After October 1, 2008, EPA will commit to:

- Identify those facilities that have not met their interim or final milestones.
- Within 60 days of identifying such a facility, will initiate a corrective action dialogue with the State.

Recommendation 2-3: We recommend that the EPA Region 3 Regional Administrator instruct staff to collect information and report on the amount and source of funding for the aforementioned “select priority facilities” as part of the CBPO’s annual reporting process.

Status: Task ongoing. Starting on January 1, 2009, and every year thereafter until the priority facilities have completed their upgrades, EPA will track the amount and source of funding allocated for undertaking the required treatment upgrades for each of the priority facilities identified by EPA. This information will be included in the Chesapeake Action Plan’s operation data base, which will be updated at least annually and distributed to the Bay partners.

Recommendation 2-4: We recommend that the EPA Region 3 Regional Administrator instruct staff to promote awareness of and use of the “Financing Alternatives Comparison Tool” and other financial analysis tools within the Chesapeake Bay community.

Status: Task ongoing. To promote greater awareness and use of the “Financing Alternatives Comparison Tool,” EPA will: continue to develop and implement webcasts on the tool for States and grantees; streamline the tool to make it easier to use for local governments; and expand the existing user guide and release it by October 1, 2008.

Recommendation 2-5: We recommend that the EPA Region 3 Regional Administrator instruct staff to continue to assist States in their development of effective trading programs by ensuring that: (a) States establish a common nutrient trading currency, and (b) lessons learned are captured and disseminated. In addition, if an interstate trading protocol program is developed, EPA should develop a formal mechanism to track water quality trading across State lines.

Status: Task ongoing. EPA is providing assistance to States in developing effective trading programs by: (a) establishing the “delivered load” as a common currency using the Chesapeake Bay watershed model, and (b) sharing lessons learned through a standing EPA-State nutrient trading workgroups. EPA will also document the lessons learned on the Chesapeake Bay trading programs to share with other watersheds. EPA will develop a process for tracking interstate trades if they occur that will transparently track trades across State lines and assure that such trades use the same trading “currency.”

Recommendation 3-1: We recommend that the EPA Region 3 Regional Administrator work with NPDES-delegated States to complete current efforts, related to industrial discharges, to: (a) characterize current nutrient discharge levels; (b) refine nutrient cap loads, where appropriate; and (c) issue permits reflecting modified cap load.

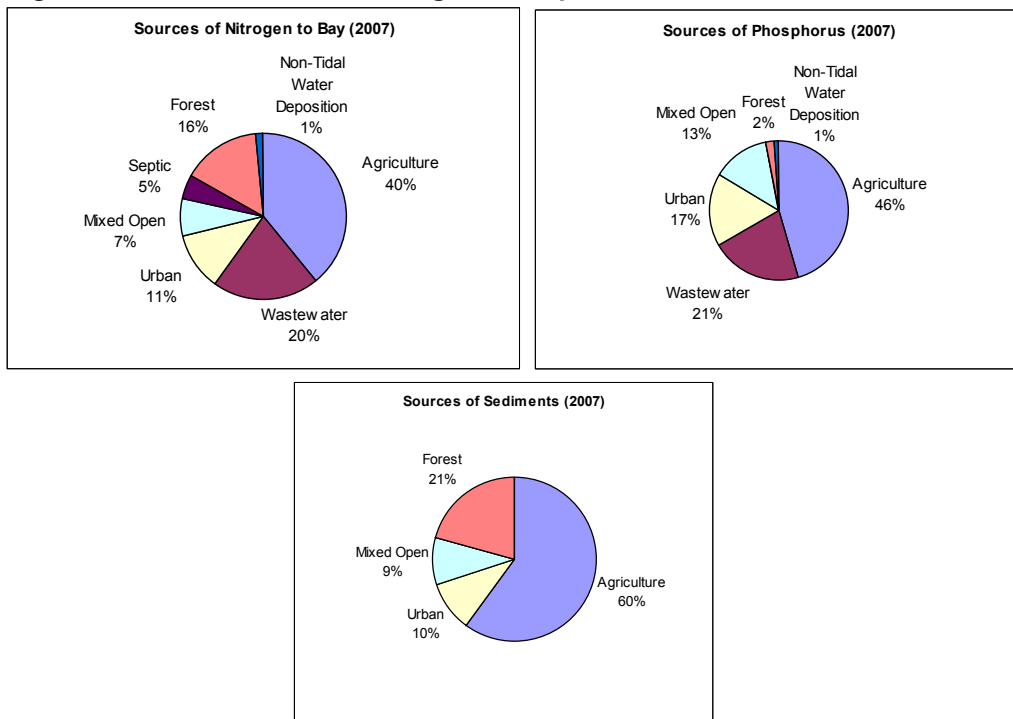
Status: Task ongoing. (a) EPA has already worked with key States to obtain the necessary data to properly characterize the nutrient loadings from industrial dischargers. These point sources are being required through their permits to conduct the appropriate monitoring. By May 2011, EPA will work with the States to: (b) develop facility specific nutrient loading targets for those facilities and (c) place these loading targets, where appropriate, into the NPDES permits for these facilities as permit limits.

Appendix E

Nutrient and Sediment Contributions to Bay Water Quality Degradation

Nutrient overload has been identified as the primary cause of water quality degradation within the Chesapeake Bay. Nitrogen and phosphorus, also known as nutrients, are the basic building blocks for vegetation. However, in an aquatic environment, excess nutrients fuel large algal blooms that block sunlight and deplete oxygen as the algae decompose. Without sunlight, underwater bay grasses cannot grow, and without sufficient oxygen blue crabs and fish cannot live. Nutrients come from many sources, such as lawn fertilizer, wastewater treatment plants, septic systems, cropland, livestock, and the air. The pie charts in Figure E-1 below illustrate the contributions of nitrogen, phosphorus, and sediment from various sectors.

Figure E-1: Contributions of Nitrogen, Phosphorus, and Sediment



Source: CBPO, Chesapeake Bay Watershed Model, v.4.3.

Note: Air deposition has been included in each category.

The Chesapeake Bay partners estimate the delivery of nutrients and sediment to the Bay using the Chesapeake Bay watershed model. Models use mathematical representations of the real world to estimate the effects of complex and varying environmental events and conditions.⁷ The amount of a particular pollutant discharged to a water body is described as “loading.” The following tables report the estimated loadings of nitrogen, phosphorus, and sediment to the Bay from 1985 to 2007.

⁷ Chesapeake Bay Website: <http://www.chesapeakebay.net/modeling.aspx?menuitem=19303>

2007 Loadings Data Tables

Table E-1: Total Nitrogen

Source	1985 Loadings Data	2007 Loadings Data	Tributary Strategy Goals	Additional Reductions Needed
Agriculture	149,380,071	102,805,884	52,390,555	50,415,328
Wastewater	87,720,651	53,435,365	43,817,101	9,618,264
Urban	30,550,094	29,856,931	20,418,701	9,438,230
Mixed Open	17,582,281	18,790,680	14,484,056	4,306,624
Septic	10,107,534	12,502,557	9,353,899	3,148,658
Forest	38,713,421	41,022,309	41,020,670	1,640
Non-Tidal Water Deposition	3,485,098	3,528,180	2,947,122	581,059
All Sources	337,539,149	261,941,906	184,432,104	77,509,802

Source: Estimates from Chesapeake Bay watershed model, v. 4.3

Table E-2: Total Phosphorus

Source	1985 Loadings Data	2007 Loadings Data	Tributary Strategy Goals	Additional Reductions Needed
Agriculture	11,566,380	8,274,491	5,088,317	3,186,174
Wastewater	9,172,764	3,810,682	3,521,573	289,109
Urban	3,732,946	3,156,303	1,944,339	1,211,965
Mixed Open	2,122,897	2,425,843	1,818,111	607,732
Septic 0	0		0	0
Forest	382,089	404,672	397,407	7,265
Non-Tidal Water Deposition	156,327	164,538	176,796	-12,258
All Sources	27,133,402	18,236,529	12,946,543	5,289,986

Source: Estimates from Chesapeake Bay watershed model, v. 4.3

Table E-3: Total Sediment

Source	1985 Loadings Data	2007 Loadings Data	Tributary Strategy Goals	Additional Reductions Needed
Agriculture	4,073,853	2,861,397	1,521,416	1,339,981
Wastewater	0	0	0	0
Urban	413,341	475,847	256,724	219,123
Mixed Open	377,130	427,946	381,892	46,054
Septic	0	0	0	0
Forest	969,216	993,950	1,042,725	-48,775
Non-Tidal Water Deposition	0	0	0	0
All Sources	5,833,540	4,759,140	3,202,757	1,556,383

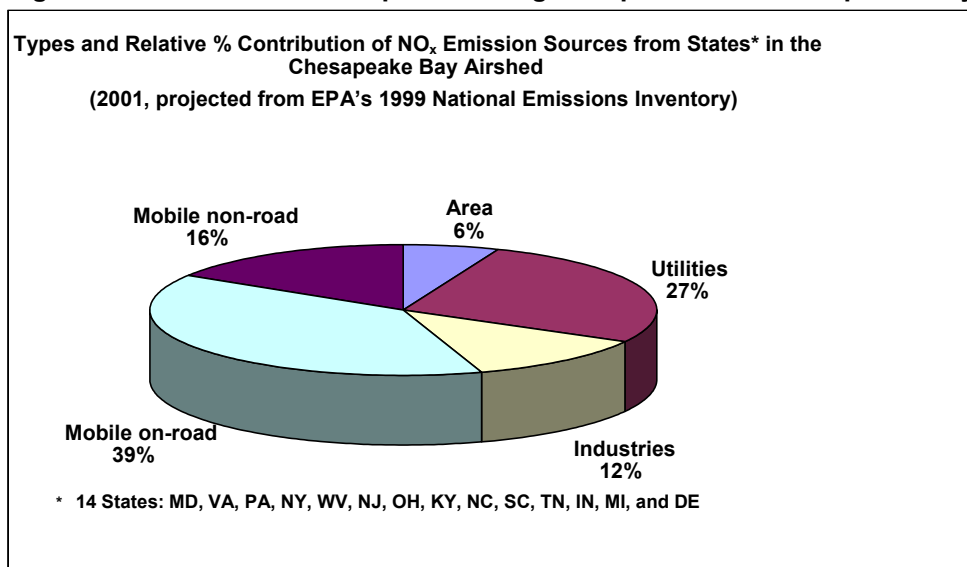
Source: Estimates from Chesapeake Bay watershed model, v. 4.3

Appendix F

Opportunities to Further Reduce Mobile Source Emissions

The single largest source of nitrogen deposition into the air comes from mobile sources. Figure F-1 shows the type and relative percent contribution of NO_x air emissions sources that deposit in the Bay. Utilities and mobile on-road sources, such as cars and trucks, account for nearly two-thirds of all air pollution sources of nitrogen in the Chesapeake Bay airshed.

Figure F-1: Sources of Atmospheric Nitrogen Deposition to Chesapeake Bay



Source: EPA and National Oceanic and Atmospheric Administration

We identified five opportunities for achieving additional emission reductions from mobile sources:

1. **Continue to encourage use of alternative forms of transportation.** Each driver mile forgone takes a gram of nitrogen out of the Bay's burden. For every 500 miles that a person goes without driving, nearly a pound of nitrogen is kept out of the atmosphere.
2. **Adopt stricter vehicle emissions standards.** Under the federal Clean Air Act, States have the option of adopting the California low emissions vehicle standards, which are more stringent than the national standards. Two Bay program members, Maryland and Pennsylvania, have adopted the California low emissions vehicle regulations.
3. **Promote low emissions vehicles.** Bay partners can champion the roll-out and use of zero emission vehicles, such as battery/electric and hydrogen fuel cell vehicles, or low emission vehicles, via clean State and local on-road fleets.

4. **Develop control strategies to reduce emissions from heavy-duty diesel vehicles.**
Heavy-duty diesel vehicles are substantial contributors to airborne NO_x. Bay program members could consider control strategies such as heavy-duty diesel vehicles retrofits, and special fuel formulations to reduce emissions.

5. **Enforce prohibitions on idling and encourage truck stop electrification.**
Maryland, Pennsylvania, Virginia, and the District of Columbia have each issued motor vehicle idling regulations and should ensure that idling regulations are enforced. Bay partners could consider increasing truck stop electrification infrastructure, which allows drivers to “plug in” their trucks to electrical outlets when parked instead of idling to run the electrical systems.

Appendix G

Agency Response

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL -9 2008

THE ADMINISTRATOR

MEMORANDUM

SUBJECT: *Official Draft Evaluation Report: EPA Needs to Better Report Chesapeake Bay Challenges*

TO: Bill Roderick
Deputy Inspector General

Thank you for the opportunity to comment on the ***Official Draft Evaluation Report: EPA Needs to Better Report Chesapeake Bay Challenges***. The recommendations of the draft report are appropriately focused on EPA improving reporting to Congress and the public and further engaging local governments and watershed organizations. Therefore, EPA concurs with all of the recommendations in the official draft report. As is customary, the Agency will prepare and submit a corrective action plan within 90 days of receipt of the final report. This action plan will lay out the Agency's action, already initiated or planned, to address your recommendations.

If you or your staff has any questions related to our response to the draft report, please contact Jeffrey Lape at (410) 267-5709 or Richard Batiuk at (410) 267-5731.

A handwritten signature in black ink, appearing to read "S. L. Johnson".

Stephen L. Johnson

cc: Benjamin Grumbles, Assistant Administrator, Office of Water
Donald Welsh, Regional Administrator, Region III
Jeffrey Lape, Director, Chesapeake Bay Program Office, Region III
Jon Capacasa, Director, Water Protection Division, Region III
Richard Batiuk, Associate Director for Science, Chesapeake Bay Program Office
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Lorraine Fleury, Audit Coordinator, Region III
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Dan Engelberg, Director of Water and Enforcement Issues, Office of the Inspector General

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Appendix H

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