U.S. House of Representatives
Committee on Transportation and Infrastructure
Washington, DC 20515

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July 29, 2008

SUMMARY OF SUBJECT MATTER

TO: Members of the Subcommittee on Water Resources and Environment

FROM: Subcommittee on Water Resources and Environment Staff

SUBJECT: Hearing on Protecting and Restoring America's Great Waters, Part II: Chesapeake Bay

PURPOSE OF HEARING

On Wednesday, June 30, 2008, at 2:00 p.m., in Room 2167 Rayburn House Office Building, the Subcommittee on Water Resources and Environment will receive testimony from representatives from the Government Accountability Office (GAO), the U.S. Environmental Protection Agency (EPA), the Chesapeake Bay Commission, the University of Maryland, and other stakeholder organizations and individuals on recommendations for the protection and restoration of the Chesapeake Bay.

BACKGROUND

This memorandum summarizes the state of the Chesapeake Bay, and efforts to protect and restore it through the Chesapeake Bay Program. In 1983, the states of Maryland, Pennsylvania, and Virginia, the District of Columbia, the Chesapeake Bay Commission,[1] and the EPA signed the first Chesapeake Bay Agreement with the aim of protecting and restoring the Bay. The Chesapeake Bay Agreement resulted in the creation of the Chesapeake Bay Program, a partnership that directs and conducts the restoration of the bay. The Chesapeake Bay Program is authorized through the Clean Water Act. EPA's Chesapeake Bay Program Office, based in Annapolis, Maryland, provides support to the Chesapeake Bay Program.

[1] The Chesapeake Bay Commission is a tristate legislative commission representing Maryland, Pennsylvania, and Virginia.

The Chesapeake Bay (the Bay) is the largest of the nation's estuaries. Largely located between Maryland and Virginia, it is nearly 200 miles long, 35 miles wide at its largest point, and covers more than 4,500 square miles. Having an average depth of only 21 feet, the Bay is relatively shallow.

Estuaries are bodies of water that receive both inflows from rivers and tidal inflows from the ocean. The Chesapeake Bay receives approximately half of its water from the Atlantic Ocean, and the other half is freshwater from the numerous rivers and streams that enter the Bay. The Susquehanna River is the largest source of freshwater entering the bay, providing approximately 50 percent.

The Chesapeake Bay watershed is that geographic area from which water ultimately drains into the Chesapeake Bay (*see figure below*). The watershed includes the District of Columbia and parts of six states: Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia. It covers approximately 64,000 square miles.

Figure: Chesapeake Bay Watershed

Source: US EPA Office of Inspector General

The population of the Bay watershed has been steadily increasing since the mid-twentieth century. Between 1950 and 2000, the watershed's population nearly doubled from over 8 million to nearly 16 million individuals. The Government Accountability Office (GAO) estimates that the population of the Bay watershed will reach 18 million by 2020.

The Chesapeake Bay is a rich habitat for a wide variety of plants and animals. It is home to 3,700 species including blue crabs, ducks, herring, oysters, shad, and striped bass.

The State of Chesapeake Bay

State of the Chesapeake Bay: The Chesapeake Bay ecosystem, including water quality, is under stress. Sustained and excessive levels of pollution have resulted in water quality and habitat degradation, and have also contributed to the decline in populations of some species.

The Chesapeake Bay Program tracks progress using 13 ecosystem and water quality indicators that are grouped into three priority areas: Water Quality; Habitat and the Lower Food Web; and Fish and Shellfish. Water quality across most of the Chesapeake Bay is degraded. Critical habitats have been harmed and the lower food web[2] has been pushed out of balance. Many of the Bay's fish and shellfish populations are below historic levels.

Good water quality is necessary to support a healthy Bay ecosystem. The Bay Program tracks dissolved oxygen, water clarity, an algal indicator, and chemical contaminants to assess the Bay's water quality. Dissolved oxygen is necessary for fish and shellfish to survive. Water quality data collected between 2005 and 2007 indicates that approximately 12 percent of the Bay and its tidal tributaries met dissolved oxygen standards. The Chesapeake Bay Program notes that this is "a sharp decrease" from 28 percent in 2004 through 2006. Water clarity is necessary for sunlight to reach underwater plants. Water clarity is impeded by excess levels of sediment and algae, among other factors. The Bay Program reports that an estimated 12 percent of the Chesapeake Bay had acceptable water clarity in 2007. Algae are microscopic organisms that sit at the bottom of the food chain and are relied upon by many other species for food and oxygen production. However, in excess quantities they block sunlight from reaching bay grasses, resulting in the degradation of Bay habitat. In addition, large amounts of decomposing algae decrease dissolved oxygen levels. Large-scale algal growth, known as algal blooms, results from excess nutrients entering water bodies. The Bay Program reports that, in 2007, 74 percent of the Bay had unacceptable levels of the indicator[3] used to track algal levels. The Bay Program reports that 67 percent of the Bay's waters and tidal tributaries are impaired or partly impaired due to chemical contaminants, chiefly PCBs (polychlorinated biphenyls.)

Life in the Chesapeake Bay is reliant upon high-quality habitat and food sources to survive. The Bay Program assesses habitat and the lower food web through indicators that measure bay grasses, bottom habitat, wetlands, and phytoplankton. Bay grasses serve as a critical habitat for commercially important species such as the blue crab and striped bass. 2007 data shows that bay grasses cover 65,000 acres, or 35 percent, of the 185,000 acre restoration goal. However, this is down from the 2002 level of 90,000 acres. The bottom of the bay serves as the habitat for the Bay's benthic, or bottom-dwelling, communities such as worms and clams. Benthic habitat can be

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[2] The Bay Program uses a measure of phytoplankton as its indicator for the Lower Food Web.

[3] The Bay Program measures the amount of *chlorophyll a* in the Bay to measure the amount of algae present.

impaired through low dissolved oxygen levels and increased pollutants, including chemical contaminants. The Bay Program reports that 43 percent of the bottom habitat was healthy in 2007. On a Bay-wide scale, the Bay Program reports no significant change in the amount of wetland acres between 1996 and 2005. However, the Bay Program notes that on the local scale there have been some significant changes. Phytoplankton, or algae, form the base of the food web and are used as an indicator of the health of the Bay's surface waters. The Bay Program reports that data from spring 2007 shows that 55 percent of the Bay's phytoplankton communities are considered healthy.[4]

Healthy and abundant fish and shellfish populations are central to the Bay ecosystem, and important parts of the Bay economy. The Chesapeake Bay Program assesses fish and shellfish population health by measuring the abundance of blue crabs, striped bass, native oysters, juvenile menhaden, and shad. The Chesapeake Bay Program reported in 2007 that the blue crab population was at 78 percent of the 200 million blue crab interim target. However, in 2008, both Maryland and Virginia announced stringent catch limitations on blue crabs due to significant declines in populations. Striped bass support one of the most important commercial and recreational fisheries on the Atlantic coast. In the 1980s a fishing moratorium was placed on striped bass in the Bay. This is attributed, in part, to the recovery of striped bass populations in the region by 1995. Results for 2007 are unavailable, but the Bay Program reports that scientists are concerned about the impacts that disease and reduced food supply may have on a sustainable stock. In the nineteenth and much of the twentieth century, oysters were a major commercial fishery in the Bay. Over-harvesting, pollution, and disease have reduced stocks to only 8 percent of current restoration goals in 2006. The Bay Program reports that the abundance of shad is at 22 percent of the targeted goal. Menhaden are an important prey species for higher level predator fish (liked striped bass). The number of juvenile menhaden in the Bay is at a significantly lower, albeit stable, level than the number present in the mid-1970s through the mid-1980s.

Sources of Chesapeake Bay Impairment: The primary sources of the Bay's impairment are excess nutrients and sediment. Chemical pollutants are also a factor in some areas of the Bay and its tributaries.

The primary nutrients loadings entering the Chesapeake Bay are nitrogen and phosphorus. Nutrients are necessary for life on both land and water. However, excessive quantities of nutrients can result in algal blooms that block sunlight, and also result in decreased dissolved oxygen levels as a result of decomposition of algae and the die-off of plants and other organisms.

Sediments consist of loose particles of clay, silt, and sand. The release of sediment through erosion is a natural process. However, excess loadings of sediment result in a negative impact on water quality. The sediment can both block sunlight – decreasing water clarity – as well as providing a vector for nutrient particles to attach to as they make their way through the Bay watershed and into the Bay. Sediment can also smother benthic organisms, such as oysters, as it settles to the bottom. It can also impair shipping when it accumulates in harbors and shipping channels.

Chemical contaminants, or toxics, can cause harm to humans and aquatic life. Mercury is the most common toxic metal found in the Bay. Organic toxic contaminants include PCBs, PAHs

[4] Healthy phytoplankton levels are determined as having the right species of phytoplankton, and in the proper quantities.

(polycyclic aromatic hydrocarbons[5]), and a variety of pesticides. Endocrine disrupting chemicals have also been found in a number of Bay tributaries. Some chemical contaminants, such as mercury or other toxics, can bioaccumulate – resulting in increasing loadings in species at the higher end of the food chain. This can result in adverse health effects.

Sources of Chesapeake Bay Pollution: The primary sources of these pollutants come from throughout the Bay watershed and consist of agricultural runoff, wastewater treatment facilities, land-use changes and urban stormwater, and atmospheric deposition.[6]

Agricultural runoff of nutrients and sediment is the largest source of pollutants into the Chesapeake Bay. The runoff of nutrients, such as nitrogen or phosphorus, into the Bay and its tributaries often occurs after precipitation following fertilizer application. Sediment runoff from agricultural areas is also a source of impairment. According to the Chesapeake Bay Program, the implementation of practices to reduce agricultural runoff has resulted in a decrease in the amount of agricultural runoff – nutrients and sediments - that enters the Bay. These best management practices consist of, for example, planting winter cover crops, and planting vegetative buffers at the edge of tributaries or the Bay. The Bay Program reports that agricultural pollution controls, for 2007, have resulted in 48% of the nitrogen goal achieved, 51% of the phosphorus goal achieved, and 48% of the sediment goal achieved.

Wastewater treatment facilities contribute to nutrient loadings into the Bay and Bay tributaries. According to the Bay Program, these facilities contribute 20% of the nitrogen loadings, and 22% of the phosphorus loadings. The Bay Program notes, however, that decreases in the amount of nutrients discharged from wastewater treatment plants account for a large portion of the estimated nutrient reductions, as of 2007. In 2005, Bay jurisdictions began putting into place a new permitting approach that requires hundreds of wastewater treatment facilities to install a new generation of nutrient reduction technologies. Since 1985, wastewater treatment facilities have achieved 69 percent of their nitrogen goal, and 87 percent of their phosphorus goal.

New land development (including urban and suburban development) is increasing nutrient and sediment loads at rates faster than restoration efforts are reducing them. Loadings from developed and developing lands include urban stormwater runoff, septic systems, and runoff from mixed open areas (golf courses, parks.) Development often displaces natural, absorbent surfaces with hard impervious surfaces. Precipitation that may have been absorbed, instead hits a hard surface, like concrete, a building, or a road, in a developed area and washes and is quickly channelized into streams or other waters. This results in increasing levels of water, nutrients, sediment, and other pollutants into these streams, causing further erosion and excess loadings. In addition, increased population growth and development is associated with increased vehicle usage, resulting in higher levels of atmospheric deposition of pollutants (*see below*). Development in the Chesapeake Bay watershed often occurs on formerly agricultural or forested lands. Therefore, agricultural runoff may be displaced with urban stormwater runoff. Improvements in landscape design and stormwater management practices can decrease urban and developed land runoff issues.

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[5] PAHs are formed when gas, oil, or coal are burned. They are common in areas with high rates of development, or with high levels of vehicle traffic.

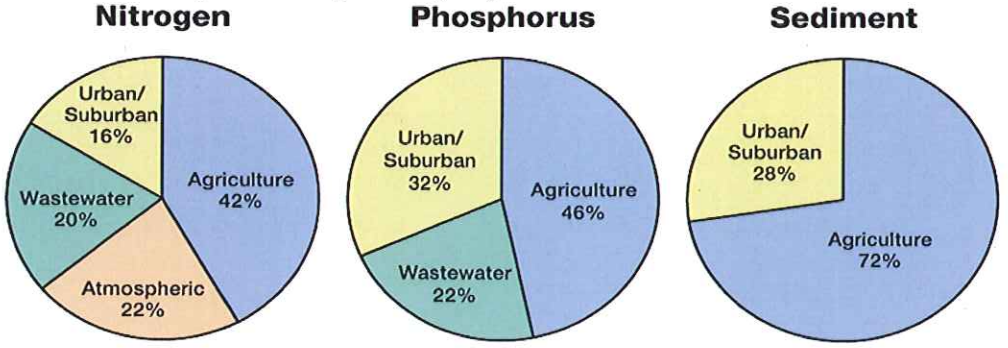
[6] Atmospheric deposition is a process by which airborne pollutants settle directly onto the surface of a water body (direct deposition), or reach a water body indirectly through deposition onto land surfaces and subsequent run-off through wet weather events (indirect deposition).

However, the Chesapeake Bay Program notes that "pollution increases with land development...have surpassed the gains achieved from improved landscape design and stormwater management practices." This, in combination with significant population increases, has resulted in increased adverse impacts from this source.

Atmospheric deposition stems from emissions from vehicles, power plants, agriculture (ammonia from animal feeding operations), and industry. Pollutants from these emissions, including nitrogen, land directly on water bodies (direct deposition) or on land and are ultimately carried into water bodies (indirect deposition.) Indirect deposition accounts for 22 percent of the Bay's 2007 nitrogen loadings. The Bay Program did not report direct deposition figures for this period. The Bay jurisdictions rely upon federal and state air pollution control programs to reduce atmospheric deposition loadings. EPA and the Bay Program had relied on the Clean Air Interstate Rule (CAIR) to reduce 8 million pounds of nitrogen deposition by 2010. However, in early July 2008 the District of Columbia Circuit Court of Appeals struck down this rule. At this point in time, then, neither EPA nor the Bay Program can expect to use this mechanism for nitrogen deposition reductions.

The following figure, produced by the Bay Program, illustrates the relative source loadings for nitrogen to the Bay for 2007.

Sources of Pollution Loadings for Chesapeake Bay Impairments

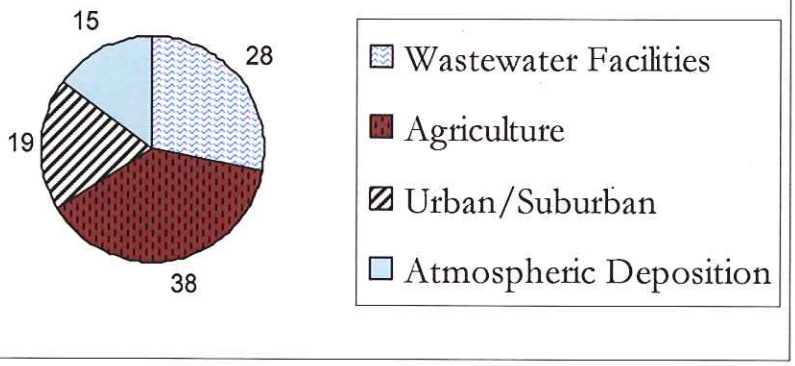


Wastewater loads based on measured discharges; the rest are based on an average-hydrology year.
Does not include loads from direct deposition to tidal waters, tidal shoreline erosion or the ocean.
Data and Methods: www.chesapeakebay.net/status_reducingpollution.aspx

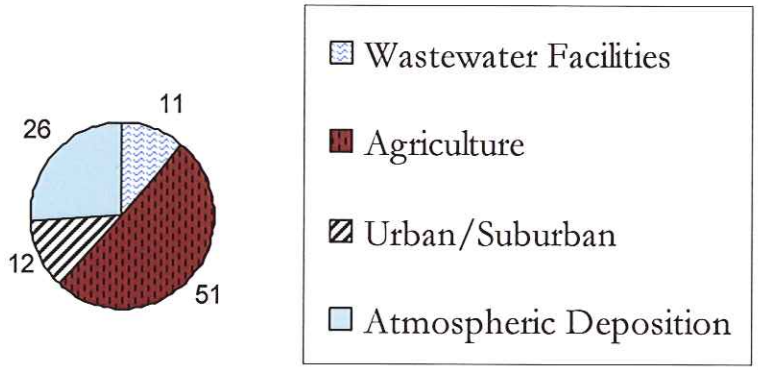
Source: Chesapeake Bay Program (2007)

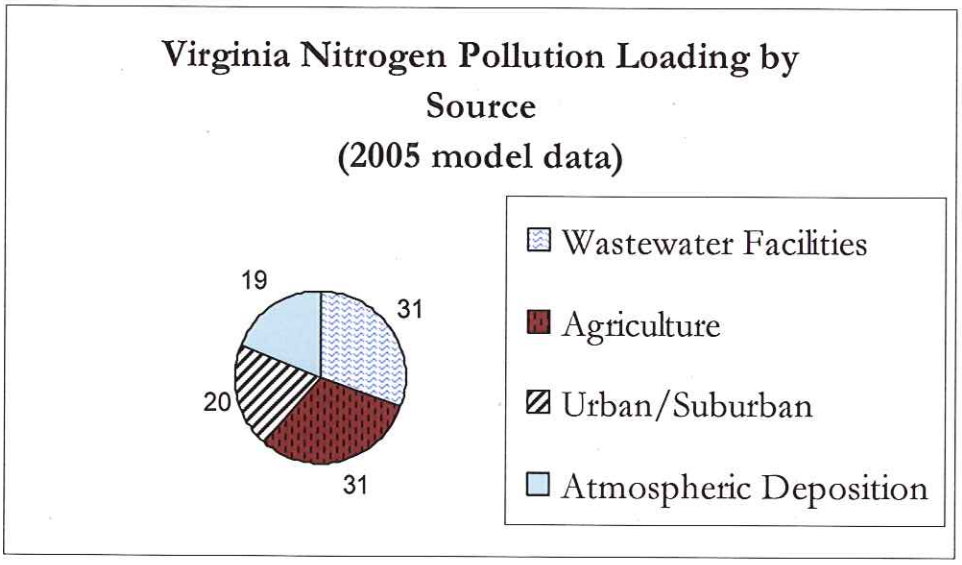
While parts of six states and the District of Columbia comprise the Chesapeake Bay watershed, most of the pollutant loading comes from only three: Maryland, Pennsylvania, and Virginia. It is important to note that while each produces pollution from the same sources, the share of each of these loading sources is different, per state. This is a function of both the types of economy, geography, and population centers. The following figure illustrates the relative pollution loadings of nitrogen for Maryland, Pennsylvania, and Virginia. The data comes from 2005 Chesapeake Bay Program modeled loading data.

Maryland Nitrogen Pollution Loading by Source (2005 model data)



Pennsylvania Nitrogen Pollution Loading by Source (2005 model data)





The significance of these differential loadings is that each state will require different approaches to decrease its respective loadings. In other words, each state will have to apply resources differently in order to cost effectively decrease its own loadings.

The Chesapeake Bay Agreements

In the 1970s and early 1980s, EPA found that degradation of the Chesapeake Bay was taking place as a result of nutrient runoff, population increases, and discharges from wastewater treatment facilities. In response, in 1983 the states of Maryland, Pennsylvania, and Virginia, the District of Columbia, the Chesapeake Bay Commission, and the EPA signed the first Chesapeake Bay Agreement.

The Chesapeake Bay Agreement established the Chesapeake Executive Council and resulted in the Chesapeake Bay Program. The Chesapeake Executive Council meets annually and consists of 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. Subsequent Chesapeake Bay Agreements were signed in 1987, 1992, and 2000. The most recent agreement, *Chesapeake 2000*, is identified by the Bay Program as its strategic plan.

The Chesapeake Bay Program is a partnership that directs and conducts the restoration of the bay. It was authorized by Section 117 of the Clean Water Act. It currently includes partners at the federal, state, and local levels, as well as academic institutions and nonprofit organizations. The current Director of the Chesapeake Bay Program is Jeffrey Lape, of the EPA.

EPA's Chesapeake Bay Program Office (CBPO) provides support to the Chesapeake Executive Council and the Bay Program. Among its responsibilities are the development and provision of information on the environmental quality and living resources of the Chesapeake Bay ecosystem. It also is responsible for coordinating EPA's activities with other federal agencies and state and local authorities participating in Chesapeake Bay restoration activities. The Chesapeake Bay Program recently produced as assessment of Bay health and restoration progress in April 2008: *Chesapeake Bay 2007 Health and Restoration Assessment: A Report to the Citizens of the Bay Region.*

The most recent Chesapeake Bay Agreement, *Chesapeake 2000*, is identified by the Bay Program as its strategic plan. In this agreement 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. This result would mean avoiding a requirement to develop a Total Maximum Daily Load (TMDL)[7] for the Bay. The non-signatory Bay watershed states of Delaware, New York, and West Virginia also agreed to the *Chesapeake 2000* water quality gorals, and signed onto a six-state Memorandum of Understanding with EPA.

The signatories to *Chesapeake 2000* agreed to 102 commitments to restore the Chesapeake Bay. These included management actions and ecosystem health measurements. The commitments were organized into five broader restoration goals: Protecting and restoring living resources (14 commitments); Protecting and restoring vital habitats (18 commitments); Protecting and restoring water quality (19 commitments); Sound land use (28 commitments); and Stewardship and community engagement (23 commitments).

In 2006, GAO testified at a Subcommittee for Water Resources and Environment hearing that between 1995 and 2004, $3.7 billion in direct funding has provided for the Bay restoration effort by 11 federal agencies, Maryland, Pennsylvania, Virginia, and the District of Columbia. Federal agencies provided approximately $972 million, and the states and the District of Columbia provided approximately $2.7 billion. Of the federal agencies, the Army Corps of Engineers has provided the greatest amount of funding: $293.5 million. Of the states, Maryland provides the greatest amount of direct funding: over $1.8 billion.

GAO also determined that $1.9 billion was provided between 1995 and 2004 for activities that had an indirect impact on Bay restoration. Federal agencies provided $935 million in indirect funding, and Pennsylvania and the District of Columbia provided $991 million. The U.S. Department of Agriculture, largely through the Natural Resources Conservation Service, provided the greatest amount of federal funding - $496.5 million. Pennsylvania provided $863.8 million of the $991 million in indirect funding.

Reviews and Effectiveness of the Chesapeake Bay Program

In October 2005, the Government Accountability Office[8] released an evaluation of the Chesapeake Bay Program, titled *Chesapeake Bay Program: Improved Strategies are Needed to Better Assess, Report, and Manage Restoration Progress.*[9] Since the release of this report, the Chesapeake Bay Program has been working to address these recommendations. Primary findings included:

- While the Bay Program had established 100 measures to assess Bay ecosystem trends, it had not developed an approach that would allow it to integrate all of these measures. As a result, it was unable to assess the progress made by the overall restoration effort in achieving the five *Chesapeake 2000* goals. GAO recommended that the CBPO develop an approach to allow the Bay Program to combine its measures into a few broader-scale, or

[7] 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.
[8] At the time of the report's release, GAO was known as the General Accounting Office.
[9] GAO-06-96

keystone, measures that could be used to assess Bay progress. In its Subcommittee for Water Resources and Environment testimony in July 2006, GAO testified that the Bay Program was still working to develop and implement a fully integrated approach for assessing restoration progress;

- The Bay Program's primary mechanism for reporting on the health status of the Bay did not provide an effective or credible assessment of the bay's current health status. GAO recommended that the Bay Program clarify on how it describes the Bay's current health and management actions to restore the Bay. In response, the Bay Program developed a new reporting format;

- The Bay Program did not have a comprehensive, coordinated implementation strategy that allowed the strategic targeting of resources on the most cost effective restoration activities. GAO recommended that the Bay Program develop such a strategy. In response, the Bay Program began developing an internet-based approach to unify its planning documents, and had adopted a funding priority framework. GAO subsequently noted in its July 2006 congressional testimony that the Bay Program had not yet developed the necessary comprehensive implementation strategy to reflect what could be accomplished with available resources.

In December 2007, Congress passed the Consolidated Appropriations Act of 2008 (P.L.110-61) and directed EPA to implement all of the recommendations of the 2005 GAO report and to develop a Chesapeake Action Plan (CAP). The CAP would contain specified components that include realistic annual targets, actual activity reports, amounts and sources of funding, and a process to track and measure progress. The CAP was released in July 2008.

As a result of EPA and the Bay Program's acknowledgment that they would be unable to meet the goals of *Chesapeake 2000*, the Bay Program has committed to creating TMDLs for the Chesapeake Bay. The deadline for the completion of these is 2011.

In July 2008, EPA's Office of Inspector General produced an evaluation[10] of the Bay Program that contained a number of recommendations. These include:

- Improve reporting to Congress on the actual state of the Chesapeake Bay and actions necessary to improve its health;

- 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 in the CAP;

- 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.

EPA concurred with the recommendations in this report.

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[10] EPA OIG. 2008. *EPA Needs to Better Report Chesapeake Bay Challenges: A Summary Report.* Report No. 08-P-0199. (July 14, 2008)

Pending Legislation on Reauthorizing the Chesapeake Bay Program

The authorization of appropriations for the Chesapeake Bay Program in Section 117 of the Clean Water Act expired in 2005.

Congressman Gilchrest has introduced legislation (H.R. 16) to reauthorize the Chesapeake Bay Program. The Committee has not take action on this legislation.