COMMENTS OF THE
VIRGINIA ASSOCIATION OF MUNICIPAL WASTEWATER AGENCIES, INC.
REGARDING U.S. EPA'S DRAFT CHESAPEAKE BAY TMDL AND
VIRGINIA'S DRAFT CHESAPEAKE BAY TMDL WIP

NOVEMBER 4, 2010

I. INTRODUCTION & EXECUTIVE SUMMARY

On September 3, 2010, the Commonwealth of Virginia ("Virginia") submitted a Chesapeake Bay TMDL Phase I Watershed Implementation Plan ("Draft WIP" or "Virginia's WIP") to the United States Environmental Protection Agency ("EPA"). On September 22, 2010, EPA issued a Notice of Availability of the Draft TMDL and request for public review and comment on the Draft TMDL in the *Federal Register* regarding the development of a total maximum daily load ("TMDL") for the Chesapeake Bay Watershed. On September 24, 2010, EPA issued a DRAFT Chesapeake Bay Total Maximum Daily Load ("Draft TMDL" or "EPA's TMDL"). Virginia Association of Municipal Wastewater Agencies, Inc. ("VAMWA") hereby submits the following comments in response to EPA's *Federal Register* Notice, EPA's Draft TMDL, and Virginia's Draft WIP.

VAMWA is a statewide association that includes the owners and operators throughout Virginia of municipal wastewater treatment plants, which the Clean Water Act ("CWA") refers to as publicly owned treatment works ("POTWs"). Many VAMWA members' facilities clean and discharge highly-treated wastewater within the Chesapeake Bay watershed pursuant to state-issued National Pollutant Discharge Elimination System ("NPDES") permits known as VPDES permits. As owners and operators of highly-regulated pollutant removing facilities, VAMWA's members have a direct stake in the development of the Bay TMDL and in its implementation. Indeed, VAMWA members are currently completing a Bay-leading treatment upgrade program with an investment of approximately $1.5 billion to $2 billion to implement the Bay TMDL.

VAMWA submitted comments on December 18, 2009, in response to EPA's September 19, 2009 Notice and Initial Request for Public Input regarding the development of a Chesapeake Bay

TMDL. In addition to laying out guiding principles for a reasonable and effective TMDL,[1] VAMWA commented extensively on the need for "regulatory stability" for POTWs relative to the existing upgrade program currently underway and also offered many policy and technical recommendations.[2]

Unfortunately, EPA has largely disregarded VAMWA's December 2009 Comments. Moreover, EPA has incorrectly and illegally rejected Virginia's Draft WIP and instead has proposed "backstop" allocations based on EPA's previously proposed, but withdrawn and never promulgated, "reasonable assurance" regulation. The result is a TMDL that is fundamentally flawed on both technical and legal grounds. EPA's present course is obviously and openly straining the otherwise collaborative, multi-jurisdictional Bay Program partnership. Beyond the unfortunate implications of those actions for the Bay Program, VAMWA is concerned that EPA's recent approach may delay rather than further the Bay restoration process.

As explained in greater detail later in these comments, EPA's Draft TMDL suffers from a number of serious deficiencies that negatively impact both the likelihood of a successful restoration process as well as the reasonableness and legality of the TMDL.

Before turning to these deficiencies, first we are compelled to point out the severe lack of a meaningful opportunity for public review and comment on these complex regulatory proposals. The development of the Bay models has required thousands of hours of time from dozens of EPA staff over many years. However, EPA has not provided an opportunity for the public to understand how the models work and the implications of changes to the input data sets for model results. These results define the allocations that EPA has proposed in the TMDL. Therefore, although the model is being used as far more than a "tool" and is essentially being used to define scope and extent of the TMDL requirements, it very much represents a "black box" that

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[1] These Guiding Principles included sound science, cost-effectiveness, feasibility, an holistic approach, ancillary benefits, climate change mitigation, and regulatory stability. Although EPA has acknowledged that many of these are important concepts, EPA's Draft TMDL is inconsistent with its avowed goals. Specifically, EPA has failed to: (1) base allocations on sound science; (2) consider cost-effectiveness as a part of making source sector allocations (there are no discussions regarding how much the Bay TMDL will cost, whether we will be spending our dollars in the most cost-effective way, and whether there will be an adequate environmental and economic benefit for our financial commitment); (3) make appropriate timing accommodations to make the TMDL realistically feasible (a phase-in of efforts or tying implementation to funding); (4) consider and include additional reasonable options for reductions (filter feeders, innovative nutrient reduction technologies, air deposition); (5) weigh various clean-up options based upon the potential for ancillary benefit (for example, cover crops can provide not only nutrient reductions but also additional positive environmental and aesthetic impacts); (6) avoid actions that may negatively contribute to climate change (additional POTW reductions can result in more greenhouse gas emissions and the unnecessary use of expensive electricity (and associated fuels) along with expensive treatment chemicals whose manufacture and distribution have additional environmental impacts); (7) and preserve existing POTW allocations.

[2] VAMWA's December 2009 Comments are attached hereto as Appendix 1, and are incorporated by reference. VAMWA also incorporates by reference all References listed at the conclusion of these comments and all additional Appendices attached to these comments. Additionally, VAMWA incorporates by reference all EPA files or documents, no matter the form, and all materials from EPA Chesapeake Bay teams, committees, subcommittees, or workgroups pertaining to Bay clean-up efforts.

frustrates opportunities for meaningful public review and comment. Furthermore, VAMWA has made requests for information to better understand specific issues of interest in the models, but EPA has not responded to those requests. Against this background of complexity, EPA has only given the public 45 days to comment on what is arguably the most complex TMDL ever developed in the nation. We believe that the lack of transparency in combination with a limited review period fails to comply with both the spirit and the letter of the Administrative Procedure Act.

EPA's "Backstops" Jeopardize Virginia's Highly-Effective Point Source Regulations, Related $2 Billion Investment, and Nationally-Recognized Nutrient Exchange Program

Virginia's approach to POTW wasteload allocations and nutrient reductions is stringent, but also reasonable and appropriate, in its current form. Importantly, this approach is actually working. VAMWA supports the embodiment of the Virginia approach to POTW wasteload allocations from Virginia law and regulations into the Draft WIP, and urges EPA to accept this element of Virginia's WIP.

The POTW wasteload allocations under the Draft WIP are derived primarily from Virginia's Water Quality Management Planning ("WQMP") Regulation (9VAC25-720) and Chesapeake Bay Watershed General Permit Regulation (9VAC25-820). These allocations are recognized in the Virginia Nutrient Credit Exchange Program statute enacted in 2005 and codified at Virginia Code § 62.1-44.19:12 *et seq.* This approach has been touted on numerous occasions as a strong national model for addressing the nation's nutrient challenges.

Virginia's regulatory approach has a lengthy and relevant history of establishing nutrient wasteload allocations that must be taken into account when establishing those same types of wasteloads in the TMDL. Virginia attained a major milestone when its State Water Control Board's ("SWCB" or "Board") adoption of stringent point source regulations referenced above in 2005 and 2007. Those regulations established a comprehensive program for the regulation of POTWs.

Extensive State and stakeholder efforts went into Virginia's development of wasteload allocations. The allocations were even supported by aggressive advocacy groups in Virginia, including the Chesapeake Bay Foundation and the James River Association in 2005. Based on the SWCB's final adoption of the point source wasteload allocations, localities and authorities across Virginia have made major infrastructure design and financial decisions, and have constructed or are in the process of constructing major capital upgrades to implement the wasteload allocations.

To help support this construction program, the General Assembly has appropriated over $600 million in cost-share funding for treatment upgrades with the larger balance of the funding being raised directly by VAMWA member localities and authorities. In sum, an estimated total investment of $1.5 billion to $2.0 billion has very recently been made to undertake a very specific set of capital projects to implement Virginia's recently established wasteload allocations.

In addition, pursuant to the above-referenced statute and regulations, the Virginia Nutrient Credit Exchange Association, Inc. (the "Nutrient Exchange") was formed to facilitate a highly structured and highly regulated point-point trading program under the supervision of the Virginia Department of Environmental Quality ("VADEQ"). The Nutrient Exchange and its participants, working under the terms a complex, multiparty contract and the related VADEQ-approved Exchange Compliance Plan, have developed a comprehensive upgrade and compliance program that reflects the most extensive, proactive treatment upgrade program in Virginia since the secondary treatment regulations.

As a result of these many efforts by the Commonwealth, VAMWA members and others, Virginia expects to meet its regulatory point source allocations by December 31, 2010. In fact, this commendable progress is largely due to decisions made in Virginia to establish a Watershed General Permit with an early effective date of January 1, 2007 for all regulated facilities and a 4-year compliance schedule. This effectively ensured Virginia's significant point source compliance the Chesapeake 2000 deadline. VAMWA is proud to have proposed this schedule and the general permit mechanism and respectfully urges EPA to credit VAMWA for this concept and this progress by respecting the wasteload allocations set forth in the WIP.

Significantly, as recently as January 2009, EPA officially supported Virginia's regulatory approach to point source wasteload allocations and related upgrades. In fact, EPA confirmed in writing that Virginia's wasteload allocations were properly designed to meet Bay water quality standards. Now, less than two years later, EPA inexplicably proposes to ignore Virginia's approach and jeopardize Virginia's $2 billion capital upgrade program and the integrated point-point trading program. In this regard, the Draft TMDL is completely unreasonable.

Ironically, EPA itself has agreed in writing that the "regulatory stability" that VAMWA seeks should be a fundamental component of the Bay TMDL. In addition, EPA's Office of Inspector General has also agreed that allocations for significant dischargers should remain unchanged. Yet, despite this tremendously proactive effort in Virginia and EPA's own prior statements, EPA's Draft TMDL reverses course.

EPA has concluded that Virginia's WIP fails to comply with EPA's July 1, 2010 and August 13, 2010 nutrient and sediment allocations and is deficient because it does not establish sufficient "reasonable assurance" of nonpoint source implementation. EPA has established what it is calling a "backstop allocation" in response. The EPA backstops would set wastewater discharge concentrations at 4 milligrams per liter ("mg/l") for total nitrogen ("TN") and 0.3 mg/l for total phosphorus ("TP").

For VAMWA member POTWs in the York and James River basins the above concentrations are significantly lower than those used to derive Virginia's wasteload allocations, which were established by the SWCB at the level appropriate to protect local water quality consistent with the EPA Chesapeake Bay Program's documented findings that these basins have minimal or no impact on the mainstem Bay and should be established on the basis of local water quality. The

concentrations for the Upper Occoquan Service Authority ("UOSA") facility are also inconsistent with local water quality needs for the drinking water reservoir to which it discharges in the Potomac River basin. The EPA backstops unreasonably and unlawfully put Virginia's current regulatory program and the related investments that have been made at risk.

This is completely unjustifiable based upon EPA's earlier remarks, and is unwarranted based upon the minimal impact wastewater has on Bay water quality as compared to other sectors. In addition, as explained below, EPA's rejection of Virginia's Draft WIP is legally objectionable. The CWA does not give EPA the authority to review and/or approve WIPs or to direct their specific terms. EPA's decision to overwrite Virginia's Draft TMDL is unlawful.

EPA's Unpromulgated "Reasonable Assurance" Regulation Does Not Support EPA's Proposed Disapproval of the WIP and Imposition of "Backstop" Allocations

As noted above, EPA's proposal to reduce POTW wasteload allocations is based upon its view that Virginia's Draft WIP provided less than adequate "reasonable assurance" that its plan would achieve the nonpoint source load allocations. EPA's position on "reasonable assurance" is unreasonable and unlawful for many reasons.

First, EPA has no authority pursuant to the CWA to review and/or approve or disapprove Virginia's WIP. EPA's decision to do so, and its decision to reject Virginia's allocations – especially after having provided on many occasions that EPA would defer to State allocations as part of a Bay Program collaborative effort to develop a multistate Bay TMDL –thus unlawfully usurps State primacy and in particular the State's role in TMDL implementation decisions.

Second, EPA's action is inconsistent with thousands of prior EPA actions. EPA has issued and/or approved thousands of TMDLs for impaired waters across the United States. Given the tremendous pre-TMDL implementation and assurance of continuing progress under existing and reasonably anticipated additional programs – a combination that far exceeds the level of assurance of most TMDLs – Virginia's WIP is easily approvable on EPA's own precedents. EPA's proposed negative finding and associated backstops are uneven and discriminatory against Virginia and its point sources, and obviously arbitrary and capricious under the standards that EPA has defined by its own prior acts.

Third, EPA should give more consideration to the temporal aspect of the implementation process and the opportunity that the next 15 years of planned implementation brings for lawmakers and regulators to support implementation. It is unreasonable for a federal agency to announce TMDL caps and just a couple months later expect a state administrative agency (*i.e.*, no lawmaking or taxing authority) to clearly document what the future laws and taxes will be to support implementation of the EPA mandate. This simply takes time that EPA's rushed TMDL development schedule has not provided. VAMWA recommends that EPA build into its expectations an appreciation for the time constraints involved in 2010 as well as the ability of Virginia and others to build programs over a reasonable period of time. To this end, VAMWA notes approvingly the general concept of milestones and encourages EPA to consider how the

two-year milestone process could be used by all Bay States to demonstrate reasonable further progress.

Fourth, EPA's "reasonable assurance" proposal and related backstops unreasonably shift responsibility of various nonpoint sources to different people who will then pay more to make up for the now-sanctioned inactivity of other sources. This is fundamentally unfair and unjustifiable.

Fifth, EPA has inappropriately rejected Virginia's recommended expansion of the existing nutrient trading system to include additional source sectors. Given Virginia's exceptional track record of establishing large-scale trading program with high accountability, EPA's quick rejection of Virginia's concept is unwarranted.

EPA's Backstops Negatively Impact Smart Growth and Future Economic Development

Virginia's WIP better enables nutrient loads from future growth to be managed in an environmentally beneficial manner, specifically enabling a least a modest amount of capacity to be available for normal wastewater flow increases over time with advanced nutrient removal technology. This treatment would be possible in lieu of this growth being served by far less efficient on-site disposal systems ("OSDSs") such as septic systems. Further reductions to existing allocations as EPA proposes could increase net (*i.e.*, POTW plus OSDS) nitrogen loadings, work counter to smart growth principles by driving growth away from existing urbanized areas with advanced centralized treatment, and lead to negative environmental results.

VAMWA has performed simple calculations to quantify the net increase in nitrogen loading that could result from reducing POTW allocations and directing the flow associated with the "lost" treatment capacity (due to overly stringent wasteload allocations) to OSDSs. VAMWA has concluded that a reduction in the concentrations of POTW allocations could result in a net increase in total nitrogen loadings to surface water, even using the use of costly denitrifying OSDSs. Thus, EPA's backstops risk this adverse environmental impact.

Preserving POTW allocations at current levels also provides capacity for future healthy economic growth. If EPA refuses to revise its Draft TMDL, POTWs will lose some ability to serve future economic development.

To the extent that EPA believes POTWs will be able to avail themselves of non-point source offsets and thus be in a position to provide treatment capacity to customers, VAMWA notes that offsets are not widely available at the present time and thus do not represent a viable option for planning, financing or constructing major public infrastructure.

EPA's Decision to Reject Virginia's Expanded Trading Program Is Unreasonable

Virginia's WIP includes provisions for expansion of its existing nutrient trading program to include agriculture, urban stormwater, and other sectors. Implementation of an expanded trading

program would enable affected parties to incorporate cost effectiveness into management decisions, which is essential as EPA has largely ignored cost considerations in developing the TMDL. In fact, EPA has acknowledged in recent public meetings that the TMDL does not consider affordability or cost-effectiveness. Unlike EPA, local governments (POTW owners and operators) have a responsibility to their customers to seek cost-effective solutions. By ignoring cost, EPA's disapproval of Virginia's WIP essentially conflicts with the public interest in efficient and affordable regulations. EPA's acceptance of Virginia's intent to consider trading program expansion would help address this major shortcoming of the TMDL.

EPA's Approach to the James River Is Unreasonable

EPA has proposed drastic cuts to James River allocations on the basis of a highly arbitrary application of a problematic modeling framework to a scientifically-dubious chlorophyll-*a* standard. The predicted shifts in chlorophyll-*a* are statistically insignificant and non-detectable in monitoring data. However, the cuts would result in huge ($20 billion) public expenditures. Moreover, the Draft TMDL document appears to disallow Virginia's thoughtful, science-based process to remedy the technical problems associated with the standard and the model.

EPA's Bay Model Is Flawed

The Bay modeling framework has numerous sources of error and uncertainty that directly limit EPA's ability to conclude that different management scenarios would result in significantly different water quality responses. Significant technical deficiencies in EPA's modeling include: the lack of complete peer review and validation; poor model behavior in many segments; inaccurate groundwater simulation; instability in urban land use assumptions; and missing point sources.

Furthermore, EPA has used the model in ways that surpass its capabilities. For example, EPA has attempted to predict dissolved oxygen ("D.O.") concentrations and non-attainment rates in specific segments to a single percentage point level under far-reaching management scenarios. The TMDL development process has been accompanied by wide swings in predicted loads and goals with each major model version, which draws into question the validity of the model at each stage and indicates that future instability can be anticipated as the model is periodically modified.

VAMWA objects to EPA's over-reliance on instable models to the single percentage point of output as justification for extremely stringent and costly control programs, the scope and extent of which seems to change with each new model run.

EPA's Backstops Eliminate Planned Agricultural Load Reductions Despite Those Controls Being Among the Most Cost-Effective Measures for Improvement

The bulk of responsibility for nutrient reduction in the Draft TMDL has been unfairly shifted to the wastewater sector, particularly on the James River. The level of effort associated with EPA's proposed "backstop allocation" for the James River basin approximates the *status quo* for agriculture, while imposing near limit-of-technology controls on wastewater point sources. This disparate approach disregards the rules previously established in the TMDL development process that were designed to achieve fairness and equity in responsibility among sectors and makes no economic sense.

The TMDL Sediment Allocations Are Unreasonable

The "backstop" point source wasteload allocations for total suspended solids ("TSS") were based on a very low technology-based value (4-5 mg/L), which appears to have been derived from the State of Maryland's definition of enhanced nutrient removal ("ENR"). These allocations represent very large, costly reductions in currently-permitted loads for no environmental benefit. Significant point source dischargers represent a *de minimis* percentage of the TSS load to tidal waters—*less than 1%* according to Phase 5.3 model output. Even this small amount primarily consists largely of biodegradable, non-persistent material such as biological floc. In addition, there are no other scientific reports or data to support the conclusion that point source-derived TSS is a significant cause of impairments to submerged aquatic vegetation ("SAV"). Therefore, the proposed reductions have no water quality basis.

If EPA cuts TSS loads simply based on a presumption that these values would be coincident to nutrient reduction, EPA will have done so without a reasonable factual basis. Point sources can vary widely with regard to the treatment technology employed, and not all nutrient removal methods utilize filters that would achieve 4-5 mg/L effluent TSS. For example, in biological phosphorus removal, the primary means of removing phosphorus are clarification and biosolids wasting that would not include incidental TSS control to the level EPA assumes.

Furthermore, new TSS wasteload allocations erect a new, serious barrier to efficient trading of nutrient credits and offsets, and thus to more cost-effective implementation. As proposed, the TMDL would drive all POTWs to filtration for TSS purposes, and POTW TSS load reductions – which until publication of the TMDL was not known to be a problem despite years of TMDL development efforts – will become the new driver for point source compliance.

EPA's approach to TSS for POTWs is arbitrary. In contrast, there are many examples of state and EPA-approved TMDLs for sediment that involve permitting point sources at existing TSS levels (secondary treatment or best practicable controls technologies), as proposed in the draft Virginia's WIP. VAMWA supports such an approach and opposes the approach shown in Draft TMDL.

EPA's View of Relative Effectiveness is Incorrect

The nutrient loads of the James and York Rivers do not have a significant influence on the D.O. conditions of the main stem Chesapeake Bay. The impact of these southern tributaries is limited only to their local water quality defined by State standards. Thus, the TMDLs for these basins are fully within the purview of and are the responsibility of the Commonwealth of Virginia, not EPA.

EPA Has Inappropriately Failed to Consider Cost, Cost-Effectiveness, and Cost Benefit

EPA's Draft TMDL allocates reductions among various source sectors. For example, EPA has made the determination in the Draft TMDL to shift allocations from Virginia's wastewater sector to the agriculture sector. Yet, it would appear that EPA's decision is not based in any way on cost issues. This is unacceptable, particularly in light of the fact that there is insufficient federal funding for the clean-up and state and local resources are strained in a way that they have not been for many decades.

Given this economic backdrop, EPA's decision to rewrite Virginia's Draft WIP and ignore potential economic impact on Bay dischargers in the allocation process is arbitrary if not irresponsible, especially in light of the fact that EPA stopped its effort to conduct a Use Attainability Analysis as part of this TMDL process.

The proposed TMDL also does not consider cost-effectiveness, sustainability, or overall environmental benefit. Because VAMWA believes that ancillary benefits of controls should be considered as a part of the development of this TMDL to produce increase overall environmental benefit, VAMWA contracted with Malcolm Pirnie to develop a Best Management Practices Benefit Planner (BMP-BP) model to examine this issue. The BMP-BP was peer-reviewed by Virginia Tech. This peer-reviewed model was designed to consider implementation costs, energy requirements, green house gas emissions, and ancillary environmental benefits (*e.g.* creation of wildlife habitat, flood protection, human health protection) to support environmental decision making.

VAMWA has used this model to compare EPA's recommendations for the York River basin with an alternative scenario that would achieve a similar level of nutrient reduction. The alternative scenario consisted of returning municipal point sources to Virginia's recently adopted wasteload allocations based on TN= 6 mg/L and TP=0.7 mg/L (down from typical secondary treatment levels of approximately TN = 18 to 25 mg/L and TP = 6 to 8 mg/L, and slightly higher than EPA's proposed backstop level of TN = 4 mg/L and TP = 0.3 mg/L), reducing urban stormwater BMP acreage by 50% and increasing agricultural BMPs by 20%. The results indicated the following:

- Reduced capital costs by approximately 50% (approximately $1 billion)
- Reduced operation and maintenance (O+M) costs by 50% ($32 million per year)
- Increased (improved) carbon sequestration by approximately 20%

- Significantly reduced green house gas (GHG) emissions
- Increased ancillary benefits associated with wildlife habitat, flood hazard protection, and base-flow projection.

This example demonstrates that greater environmental benefit can be achieved under Virginia's WIP than EPA's TMDL backstop allocations. EPA's decision to choose a higher-cost alternative and disregard a lower-cost alternative without any justification is arbitrary and capricious.

EPA's Choice of Daily Loads That Are Too Low is Unreasonable

VAMWA is concerned that EPA has not appropriately addressed daily loads in the Draft TMDL. Existing Chesapeake Bay programs are properly built on the concept of annual load. As to point source permitting, this approach has been documented in an EPA 2004 Memorandum, and VAMWA supports that approach. In the Draft TMDL, however, EPA has inappropriately set daily loads at the segment level based upon the 95% percentile and indicates this statistical approach assumes the daily maximum load would be violated 5% of the time. Obviously this is acceptable to EPA as this statistic does not represent a real world water quality problem, and VAMWA agrees. However, VAMWA believes that higher daily loads would be appropriate, and that the ecological insignificance of daily should be clarified.

EPA Should Accommodate Virginia's Successful Point Source Trading Program

In Section 10 of the Draft TMDL, EPA addresses the subject of offsets and trading. As with the subject of POTW WLAs discussed elsewhere in these comments, this topic is another area in which the pace of Virginia's real implementation activities under the Chesapeake 2000 Agreement and related State statutes and regulations has far outpaced EPA's TMDL planning activities as of this draft. Given all that Virginia and VAMWA members have invested in the Virginia trading program, it is imperative that EPA be flexible and conform its new policies to the pre-existing laws, regulations and policies of Virginia as well as the associated compliance plan and related contracts of the Virginia Nutrient Credit Exchange Association discussed in the Draft WIP at pages 41-42.

Other Issues

- Failure to Incorporate Benefits of Filter Feeders and Alternative Technologies
- Failure to Mandate Adequate Reductions for Air Deposition
- Failure to Address Climate Change Impacts
- Lack of Management Plan for the Conowingo Dam
- Misinterpretation and Misapplication of TMDL Consent Decrees

VAMWA expands on its comments below.

II. EPA'S "BACKSTOPS" JEOPARDIZE VIRGINIA'S HIGHLY-EFFECTIVE POINT SOURCE REGULATIONS, RELATED $2 BILLION INVESTMENT, AND NATIONALLY-RECOGNIZED NUTRIENT EXCHANGE PROGRAM

On January 30, 2009, EPA sent a letter to the Director of VADEQ regarding Virginia's current regulatory approach with regard to existing nutrient cap loadings.[3] EPA's letter included clear support for Virginia's current program, and a confirmation that the cap loads were properly designed to meet Bay water quality requirements:

> Virginia developed the Virginia Chesapeake Bay Watershed General NPDES Permit, and an associated trading program to specifically address the point source allocations for each Virginia watershed in the Chesapeake Bay. EPA's Chesapeake Bay Program verified that those cap loadings were sufficient to achieve Bay water quality. Based on the assignment of wasteload allocations and EPA evaluation of the applicable cap load, EPA found that the General Permit ensured that individual point source discharges would not cause or contribute to an exceedance of the applicable Bay water quality standards.[4]

Inexplicably, 21 months later, EPA proposes to radically alter Virginia's regulatory regime and thus negatively impact the associated $2 billion construction program and an established trading program. EPA's actions in its Draft TMDL are irresponsible and cannot be reconciled with any reasoned approach to TMDL development.

VAMWA supports the embodiment of the Virginia approach to POTW wasteload allocations from Virginia law and regulations into its WIP, and urges EPA to accept this element of Virginia's WIP. The wasteload allocations ("WLAs") found in Virginia's Draft WIP are derived primarily from Virginia's Water Quality Management Planning ("WQMP") Regulation (9VAC25-720), Virginia's Chesapeake Bay Watershed General Permit Regulation (9VAC25-820), and "all SWCB-approved amendments" to those regulations. VAMWA supports an approach the recognizes the need for this regulatory stability.[5]

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[3] Attached hereto as Appendix 2.

[4] January 30 Letter at p. 2. In this letter, EPA also confirmed that it sent a letter on December 14, 2006 in which it "reported 'no objection' to the General Permit…"

[5] VAMWA has consistently advocated regulatory stability throughout this process. For example, VAMWA provided recommendations on regulatory stability to the Chesapeake Bay Wastewater Treatment Working Group on June 9, 2009 (attached hereto as Appendix 3). See also December 11, 2008 Memorandum from VAMWA/MAMWA Chesapeake Bay Team to CBP Water Quality Steering Committee (Representation of VA and MD POTW Loads in Model Scenarios) (attached hereto as Appendix 4).

Virginia's regulatory approach was developed beginning in 2005, with the agreement of a number of local government organizations including VAMWA and of the major citizen environmental groups. In 2005, the Virginia State Water Control Board ("SWCB" or "Board") adopted a package of stringent regulations;[6] in 2007, the SWCB adopted a related permitting regulation. These actions (listed below) established a comprehensive program for the (early) regulation of municipal dischargers (collectively, the "Virginia Regulations"):

- Water Quality Management Planning Regulation Amendments, 9VAC25-720
- Nutrient Enriched Waters Policy Amendments, 9VAC25-40-70
- Chesapeake Bay Watershed General Permit Regulation, 9VAC25-820

These regulations were developed pursuant to a statute enacted in 2005 and codified at Virginia Code § 62.1-44.19:12 *et seq.*

Extensive deliberations and efforts went into the statewide effort to develop Virginia's regulatory wasteload allocations. The SWCB took final action based upon those considerations, and wastewater plants (including POTWs) across the Commonwealth made major investments based upon the Board's decision.

Based on the referenced statute and regulations of the SWCB, the Virginia Nutrient Credit Exchange Association, Inc. (the "Nutrient Exchange") was created, and the Nutrient Exchange and its participants have developed the Exchange Compliance Plan.[7] This represents the most extensive, proactive effort to plan and construct municipal wastewater treatment in Virginia since national requirement for secondary treatment established in the 1970s. The Compliance Plan addresses how participating facilities will achieve and maintain compliance with their regulatory nutrient allocations beginning January 1, 2011. VADEQ has approved the Nutrient Exchange's Compliance Plan each year beginning with the first such plan in 2007 through November 2010.[8]

The approved Exchange Compliance Plan is based on construction of a large number of advanced nutrient removal facilities throughout the five major river basins as well as a number of nutrient credit trades pursuant to the State Water Control Law's Chesapeake Bay Nutrient Credit Exchange Program article and the Board's Watershed General Permit. These trades are also contractual obligations of the participants through the complex, multi-party Nutrient Credit Services Agreement, which was executed by the parties in 2007.[9]

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[6] For reference see September 12, 2005 and November 4, 2005 Memoranda from DEQ to SWCB (attached hereto as Appendix 5).

[7] Attached hereto as Appendix 6.

[8] VADEQ's approval letters are attached hereto as Appendix 7.

[9] See Appendix 6.

To help support this construction program and related nutrient credit trading, the General Assembly has appropriated over $600 million in cost-share funding for treatment upgrades.[10] The projects are constructed by the facility owners, and the State cost-share funding is disbursed, in accordance with the terms and conditions of numerous individual Water Quality Improvement Fund Grant Agreements to which VADEQ is a party.[11] Virginia's POTWs have also made significant investments in facilities to reduce loadings based upon 2005 nutrient allocations. In sum, Virginia's POTWs have estimated total costs between **$1.5 billion and $2.0 billion** to upgrade POTWs to meet nutrient loading reduction requirements.

As a result of these many efforts by the Commonwealth and local governments, Virginia is in the fortunate position of being able to testify in a recent congressional hearing to Virginia's remarkable progress, including the expectation of meeting its regulatory point source allocations by the December 31, 2010 deadline.[12] In his September 2009, testimony before the Subcommittee on Water Resources and the Environment of the House Committee on Transportation and Infrastructure, Virginia's Secretary of Natural Resources highlighted the State's financial participation and commended the Nutrient Exchange for its role in facilitating the nutrient upgrades.[13]

As noted above, EPA has previously agreed that regulatory stability should be a fundamental component of the Bay TMDL. Indeed, because of the significant investment made by local governments and the Commonwealth (as well as other Bay states), the EPA Regional Administrator publicly agreed that regulatory stability is a "priority need" and a "matter of fiduciary responsibility and public trust:"

> …the large scale public investments (estimated at over $4 billion) that are now being carried out throughout the watershed to upgrade and reduce nutrient discharges from point sources. ***A stable regulatory environment is a priority***

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[10] Fifty-five (55) POTWs have signed grant agreements with the Commonwealth for partial grant funding for upgrades. In sum, these grant agreements represent an invest by the Commonwealth of approximately $648.23 million. Despite the commitment made by Virginia and local governments (for the balance of the approximately $2 billion effort), Virginia's program is facing significant funding shortfalls. Virginia is projecting a shortfall in funding of approximately $112 million by July 2011, and has begun pro-rated payments in an effort to shore up the Water Quality Improvement Fund budget.

[11] A sample agreement is attached hereto as Appendix 8.

[12] In addition to strides made in Virginia, Baywide, the wastewater source sector was well on its way to achieving a significant percentage of their ultimate clean-up goals by 2005. As a presentation from the Chesapeake Bay Program Office ("CBPO") shows (pertinent page attached as Appendix 9), wastewater (both municipal and industrial) had achieved 63% of the nitrogen reduction goal (loadings reduced by 30.4 million pounds per year from 1985-2004) and 80% of the phosphorous reduction goal (loadings reduced by 4.9 million pounds per year from 1985-2004).

[13] Former Secretary of Natural Resources Preston L. Bryant's written comments are attached hereto as Appendix 10.

> ***need for these facilities and a matter of fiduciary responsibility and public trust.*** Therefore, EPA considers requiring further point source upgrades to the limits of technology as an option of last resort and is avoidable if the Bay partners use our creative energies to deliver sufficient nonpoint pollutant reduction commitments.[14]

In addition, the Office of Inspector General has also agreed that allocations for significant wastewater treatment facilities should remain unchanged:

> Although EPA and its Bay partners could obtain additional nutrient reductions from significant municipal wastewater treatment facilities..., these additional reductions are not cost effective or practical. Obtaining these additional reductions would require justifying additional expenditures, recalculating wasteload allocations, and reopening and modifying permits already being put in place. At this point, EPA has no plans to require additional reductions from wastewater treatment facilities.[15]

Indeed, according to the latest Phase 5.3 model runs, wastewater represented 21 and 25 percent of the average annual nitrogen and phosphorus load, respectively, to the Chesapeake Bay under the 2009 progress scenario. Under the critical 3-year condition for the TMDL (1993-1995), wastewater would represent an even lower proportion of the nutrient load with existing controls.

Moreover, wastewater treatment plants lead all sectors in nutrient load reduction. For example, the estimated 2008 wastewater loads represent a 45-percent reduction from 1985 levels and a 62-percent reduction from "no action" levels. Wastewater treatment plants are still in the process of completing major upgrades and are the only sector predicted to achieve tributary strategy loads shortly after 2010. With current levels of nonpoint source controls, the wastewater cap loads will represent only about 15-percent of the average annual nitrogen load to the Bay, and even less under critical hydrologic conditions.

Although the wastewater sector is proud of its progress in nutrient load reduction, most treatment plants are allocated at close to limit-of-technology levels, and there is almost no benefit to further reductions in point source allocations. Non-point source reduction will remain the primary means to achieve the overall loading caps.

In contrast, the Susquehanna River basin alone contributes 44 percent of the total nitrogen load to the Bay. This value actually underestimates the impact of the Susquehanna basin, because it is among the most "effective" basins at impacting hypoxia in the mainstem Bay. When relative effectiveness is considered, the Susquehanna River basin accounts for more than 60 percent of

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[14] Letter dated Sept. 11, 2008, from Donald S. Welsh, EPA Region III, to John Griffin, Maryland DRN, Enclosure A at 4 (attached hereto as Appendix 11).

[15] 2008 EPA Office of Inspector General's Report (08-P-0049) (attached hereto as Appendix 12).

the "algal units" delivered to the Bay. Regardless of implementation actions in other basins, load reductions in the Susquehanna basin are the key to attaining water quality goals.

Despite the extraordinary efforts made by Virginia's POTWs, and EPA's own prior statements, EPA's Draft TMDL threatens to disrupt these very productive recent efforts.

EPA has concluded that Virginia's WIP fails to comply with EPA's July 1, 2010 and August 13, 2010 nutrient and sediment allocations[16] and does not adequately establish reasonable assurance. EPA has established what it is calling a "backstop allocation" in response.[17] This backstop is meant to "...reduce the point source loadings as necessary to compensate for the deficiencies EPA identified in the reasonable assurance components of the jurisdictions' draft Phase I WIPs addressing nonpoint source reductions."[18]

Each of the Bay States received a "minor," "moderate," or "high" backstop depending upon EPA's view of how severely the state had missed the allocation targets and reasonable assurance mandate. Virginia received a "moderate" backstop to bridge the gap between EPA's expectations and the Virginia Draft WIP.[19] The "moderate" backstop sets wastewater discharge allocations based on concentrations of 4 milligrams per liter ("mg/l") for total nitrogen ("TN") and 0.3 mg/l for total phosphorus ("TP") and design flows (i.e., plant capacity).[20]

EPA also established what it calls "full" backstops for all Bay States. For wastewater, "full" backstops set allocations for nutrients based upon limits of technology (3 mg/l for TN and 0.1 mg/l for TP) and historical flows (2007 to 2009 averages) rather than design flows.[21] According to the Draft TMDL, EPA will use the "full" backstops "...in any of the seven watershed jurisdictions if EPA determines that a jurisdiction's final Phase I WIP is weaker than its draft Phase I WIP and requires additional backstop actions to ensure that point and nonpoint source reductions sufficient to meet WLAs and LAs are achieved and maintained."[22] VAMWA strongly opposes the use of either "moderate" or "full" backstops in Virginia. As discussed below, EPA's application of its reasonable assurance "regulation" is unlawful, unprecedented and certainly unwarranted under the circumstances. EPA has no justifiable basis (or legal authority) for setting any backstops in Virginia, much less "full" backstops as suggested by the

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[16] EPA's letters to Virginia Secretary of Natural Resources Doug Domenech establishing nutrient and sediment allocations are attached hereto as Appendix 13.

[17] Draft TMDL at 8-9.

[18] Draft TMDL at 8-9.

[19] Draft TMDL at 8-19.

[20] Draft TMDL at 8-11.

[21] Allocations for sediment also appear to be very stringent under the "full" backstop. For description of the "full" backstop see Draft TMDL at 8-11; for allocations see Appendix Q-2 (Full Backstop; Annual Loads).

[22] Draft TMDL at 8-17.

Draft TMDL and Appendix Q-2.

For many of Virginia's POTWs, the concentration levels based upon the "moderate" backstop are significantly lower than the concentration levels used to derive the WLAs in the Virginia Regulations and now in Virginia's Draft WIP. As a result, EPA's "moderate" backstop reduces POTW WLAs in order to satisfy EPA's desire for additional reasonable assurance.

EPA's Draft TMDL puts Virginia's POTWs at risk that additional dollars will be needed to complete additional upgrades that will comply with EPA's WLAs, or, even worse, that upgrades that have been completed or are well underway will be stranded in place. This is completely unjustifiable based upon EPA's earlier remarks, and is unwarranted based upon the minimal impact wastewater has on Bay water quality as compared to other sectors. In addition, as explained below, EPA's rejection of Virginia's Draft WIP is legally objectionable. The Clean Water Act does not give EPA the authority to review and/or approve WIPs, or to direct their specific terms. EPA's decision to overwrite Virginia's Draft WIP is unlawful per the Clean Water Act.

In addition, EPA's backstops set a universal technology standard on POTWs across Virginia. This is inconsistent with Virginia's more scientifically defensible site-specific approach in the Virginia Regulations. Virginia's allocations recognize that (1) the James and York River basins do not contribute to the mid-Bay impairments and instead are regulated differently for local quality objectives, and (2) a number of Virginia plants have valid site-specific needs for the allocations alternative allocations. As to the second point, for example, UOSA's allocation reflects the unique drinking water considerations of its immediate receiving water, the Occoquan Reservoir. EPA's backstop WLA would endanger the water quality of the Reservoir, and, in turn, drinking water for to up to a million Northern Virginia residents. Other POTWs with particular WLAs under Virginia law include the City of Hopewell's POTW (80% industrial flow which is far higher than a typical municipal facility) and Virginia's CSO communities (City of Lynchburg and City of Richmond). EPA's failure to consider these important issues in its Draft TMDL is unreasonable.

Not only are allocations under the Virginia Regulations and Draft WIP more appropriate than those of the Draft TMDL for technical reasons and the above-stated policy reasons, but at some point the relentless regulatory pressure to increase wastewater rates must be considered. According to Draper Aden Associates' most recent annual water and wastewater rate report, Virginia wastewater rates rose an average of 5% last year and 67% over the last decade. Many VAMWA members have reported double-digit rate increases for multiple years. This comes at a time when unemployment levels are very high (currently at 9.6%). Consideration should be given to the impact of the higher costs that EPA is forcing on Virginia's families and businesses.

For these reasons above, VAMWA objects to EPA's determination to "backstop" Virginia's Draft WIP for wastewater and supports the Virginia Regulations incorporated into the Draft WIP. EPA's backstops must be eliminated before EPA issues its final TMDL.

III. EPA's UNPROMULGATED "REASONABLE ASSURANCE" REGULATION DOES NOT SUPPORT EPA'S PROPOSED DISAPPROVAL OF THE WIP AND IMPOSITION OF "BACKSTOP" ALLOCATIONS

As noted above, EPA's decision to reduce POTW WLAs is based upon its view that Virginia's Draft WIP provided less than adequate reasonable assurance that its plan would achieve desired reductions. EPA's position on reasonable assurance is untenable for four reasons.

First, EPA's view of reasonable assurance in this TMDL is unprecedented at the federal or state level. EPA has written and/or approved thousands of TMDLs for impaired waters across the United States. Because the phrase "reasonable assurance" is undefined in either the Clean Water Act or in regulations or in guidance,[23] EPA's approach to reasonable assurance has ranged from liberal to more conservative.[24]

As examples, EPA's Paxton Creek Watershed TMDL (nutrients, sediment), Goose Creek Watershed TMDL (nutrients), Sawmill Run TMDL (nutrients), and Southampton Creek Watershed TMDL (nutrients and sediment) all contain weak reasonable assurance provisions that fail to link the identified BMPs to implementation programs. In addition, these TMDLs suggest that BMP implementation should only "eventually" meet load allocation reductions goals.[25] EPA has approved many TMDLs, including the Anacostia River Basin Watershed TMDL (sediment, TSS), the Anacostia River Basin Watershed TMDL (BOD, nutrients) and the Tidal Potomac River TMDL (PCBs), which lack schedules for reductions and consequences for failure to meet load allocations. To suggest that EPA's Draft TMDL, with its state WIPs, and implementation schedule and consequences, provides less reasonable assurance than these TMDLs is nonsensical.[26]

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[23] EPA guidance merely "define[s] when reasonable assurance must be demonstrated but not really what it is." Reasonable Assurance Workgroup Findings and Options, Principals' Staff Committee Meeting, Washington, D.C., at 13 (Sept. 22, 2008) (attached hereto as Appendix 14).

[24] In 2008, EPA's CBPO's Principal's Staff Committee established the "Reasonable Assurance Workgroup." Part of the Workgroup's charge was to develop recommendations for how "reasonable assurance" would be used for purposes of developing the Bay TMDL. Some of the materials prepared by this Workgroup (attached hereto as Appendix 14) confirm that not only is "reasonable assurance" undefined in federal law, but that EPA has previously based TMDLs on a number of different views on reasonable assurance (e.g., EPA has approved a "[b]road spectrum of acceptable reasonable assurance demonstrations in 30,000 TMDLs approved by EPA.").

[25] See Chesapeake Bay Program Principals' Staff Committee's Reasonable Assurance Workgroup, July 23, 2008 Conference Call, Attachment B, Appendix 1, Examples of Reasonable Assurance: Best Practices from EPA-Approved and Published TMDLs and Suggestions from other Sources, at 9-10.

[26] VAMWA hereby incorporates by reference all of the TMDLs EPA has written or approved and all supporting materials. These materials should be publicly available and located in EPA's files. A list of those TMDLs, although not entirely complete, is available at the following link:
http://mail.aqualaw.com/exchweb/bin/redir.asp?URL=http://iaspub.epa.gov/waters10/text_search.tmdl_search_form

Furthermore, what EPA has done in its Draft TMDL is really to promulgate a new rule—i.e., a new regulatory definition of "reasonable assurance"—without following proper regulatory procedure. EPA appears to be attempting a "do-over" of its previously unsuccessful rulemaking in the early part of the decade. On July 13, 2000, EPA published a final rule, which would have incorporated a definition of reasonable assurance into 40 C.F.R. Part 130.[27] However, Congress, states, industrial and agricultural groups, and environmental organizations opposed the rule; and, EPA withdrew it in 2003.[28] Although EPA may be frustrated by an inability to define "reasonable assurance" in its regulations, there is no justification for defining as it as a part of this TMDL without allowing for public participation and comment.

EPA's Draft TMDL is inconsistent with earlier statements it has made on this subject. For example, in September, 2008, Region III responded to a letter from Maryland's Secretary of Natural Resources John Griffin.[29] In response to a question regarding reasonable assurance, EPA stated that:

> EPA Regions II and III, our partner states and the District are committed to accelerating restoration of the Chesapeake Bay and its tributaries, and EPA Region III believes that reasonable assurance provisions in the Bay TMDL will provide one mechanism to increase the likelihood that actions are taken to reduce nutrient and sediment loads. **However, EPA Region III does not believe that implementation of the Bay TMDL depends solely on reasonable assurance or any other single TMDL element.** Rather, EPA Region III is committed to working with the States and the District to develop and execute a broader implementation framework that draws on elements in the TMDL itself (including reasonable assurance), as well as additional implementation-related information that will accompany the TMDL.[30]

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[27] Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revisions to the Water Quality Planning and Management Regulation, 65 Fed. Reg. 43,586 (July 13, 2000) (attached as Appendix 15).

[28] Withdrawal of Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revisions to the Water Quality Planning and Management Regulation 68 Fed. Reg. 13,608, 13,609 (March 19, 2003) (attached as Appendix 16).

[29] This letter is referenced in Section II above, and is attached as Appendix 11.

[30] Letter from EPA Region III to Secretary John Griffin, Enc. A at p. 2.

EPA's decision to reduce wastewater allocations because of their perceived lack of reasonable assurance is also inconsistent with statements made by EPA's CBPO last spring. See April 20-21, 2009 Presentation from B. Koroncai to PSC (Chesapeake Bay Water Quality Big Picture) at slide 13 ("Wastewater discharge load requirements will continue to be set at the discretion of states.") (attached hereto as Appendix 17).

As the discussion above makes clear, EPA's "new" strict definition of "reasonable assurance" in the Draft TMDL is unjustified based upon prior practice. Virginia's Draft WIP is more than adequate to establish "reasonable assurance" pursuant to years of EPA prior practice. EPA's proposed negative finding and associated backstops are uneven and discriminatory against Virginia and its point sources, and obviously arbitrary and capricious under the standards that EPA has defined by its own prior acts.

Second, it is not clear that EPA has adequately factored in the Bay States' two-year milestones into its reasonable assurance determination. This is directly contrary to EPA's statements in 2008 that the two-year milestones would be part of the criteria considered by EPA "as part of its reasonable assurance and implementation framework…"[31] These two-year milestones should be a sufficient backstop to the WIPs to establish adequate reasonable assurance. The Chesapeake Bay Executive Council decided in 2008 that each of the Bay States would provide a set of target reductions and associated management efforts by which EPA could judge progress towards ultimate clean-up goals every two years.[32] EPA followed up on the Executive Council's actions by issuing a letter in December, 2009 promising "consequences" for those Bay States who fall short of those two-year milestones. Although VAMWA disagrees with the concept of "consequences," EPA has not explained in its Draft TMDL why this additional accountability is inadequate for "reasonable assurance" purposes.

In a larger sense, the two-year milestones are also pieces of a larger 15 year plan (based upon an implementation period that runs from 2011 to 2025). The two-year milestones provide EPA with an opportunity to perform a regular "check-up" to determine whether the Bay States are accomplishing the goals they have set. The program itself also allows for adjustments over the full implementation period. EPA's reasonable assurance is assured by the process. Simply put, we will have the opportunity to manage this program as time goes by. EPA's view that reasonable assurance must established in absolute terms today is short-sighted and unreasonable.

Third, as a result of EPA's "reasonable assurance" decision, POTWs are bearing the weight of additional pounds of nutrients unrelated to their facilities or discharges. This shifting of responsibility onto the shoulders of point sources from non-point sources is fundamentally unfair and unjustifiable.[33] Increasing the burden on point sources is unreasonable given that EPA has acknowledged "the large scale public investments (estimated at over $4 billion) that are now being carried out throughout the watershed to upgrade and reduce nutrient discharge from point sources" such as POTWs.[34] Requiring POTWs and other point sources to make additional costly

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[31] Letter from EPA Region III to Secretary John Griffin, Enc. A at p. 2.

[32] The first set of two-year milestones are attached hereto as Appendix 18.

[33] VAMWA agrees with statements made on this point by Virginia Governor Bob McDonnell. In a June 15, 2010 letter to EPA Administrator Lisa P. Jackson (attached hereto as Appendix 19), Governor McDonnell states that "Any regulatory consequences need to be targeted to the source sector lagging behind, and not on others that are working diligently to keep in compliance with state and federal mandates."

[34] Letter from EPA Region III to Secretary John Griffin, Enc. A at p. 4.

upgrades to compensate for non-point source pollution contravenes EPA's earlier assertion that "EPA considers requiring further point source upgrades to the limits of technology as an option of last resort."[35]

Fourth, and lastly, EPA has inappropriately rejected Virginia's approach to reasonable assurance—*i.e.*, expansion of the existing nutrient trading system to include additional source sectors. As a general matter, EPA should have provided due deference to Virginia's Draft WIP. And, with regard to this issue, EPA should have allowed Virginia to move forward with its plan to develop an expanded trading program. As explained below, Virginia has a stellar track-record with regard to market-based trading, having established a very successful PS trading program. Virginia has earned the right to show how it could expand that program in a way that would provide reasonable assurance of needed reductions.

For these reasons above, VAMWA objects to EPA's determination to reject Virginia's Draft WIP and develop a "backstop" based upon reasonable assurance grounds. This error must be corrected before EPA issues its final TMDL. For the above reasons, EPA's position on "reasonable assurance" is unreasonable and arbitrary and capricious.

VAMWA's position is further supported by the fact that EPA has no authority pursuant to the Clean Water Act to review and/or approve or disapprove Virginia's Draft WIP. EPA's decision to do so, and its proposal to override Virginia's WIP is unlawful.

VAMWA does not dispute that TMDL implementation planning is important for moving clean-up programs ahead after TMDL adoption and for illustrating its NPS reduction plans. However, because WIPs are not derived from CWA section 303(d) authority,[36] the details of these plans are not subject to EPA approval or control. EPA's decision in its Draft TMDL to create "backstops"—requirements that in effect revise the Virginia's Draft WIP—are not supported by federal law.

In addition to acting without specific authorization from federal law, EPA's actions are also inconsistent with state primacy granted by Section 510 of the Act:

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[35] *Id.*

[36] Section 303(d) of the Clean Water Act mandates that states must prepare TMDLs for impaired waters, and authorizes EPA to approve or disapprove the loadings. If EPA chooses to disapprove, it has the authority to develop loadings on its own accord ("If the Administrator disapproves such identification and load, he shall not later than thirty days after the date of such disapproval identify such waters in such state and establish such loads for such waters as he determines necessary to implement the water quality standards applicable to such waters and upon such identification and establishment the State shall incorporate them into its current plan under subsection (e) of this section.") 33 U.S.C. §1313. Section 303(e) specifically gives the State the authority and responsibility to develop a "continuing planning process" for addressing navigable waters. A part of this planning process is TMDLs (again, TMDL implementation plans are not mentioned). Nowhere in the text of Section 303(d) or (e) is EPA permitted to pass judgment on state implementation plans.

> Except as expressly provided in this Act, nothing in this Act shall (1) preclude or deny the right of any state or political subdivision thereof or interstate agency to adopt or enforce (A) any standard or limitation respecting discharges of pollutants, or (B) any requirement respecting control or abatement of pollution; except that if an effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance is in effect under this Act, such State or political subdivision or interstate agency may not adopt or enforce any effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance which is less stringent than the effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance under this Act; or (2) be construed as impairing or in any manner affecting any right or jurisdiction of the States with respect to the waters (including boundary waters) of such States.")[37]

Federal law clearly gives Virginia the authority to develop its own requirements and programs, so long as they are not less stringent than those established under the Act.[38] Because EPA has no statutory authority to establish WIPs, it is impossible for Virginia's Draft WIP to be less stringent.

For these reasons, Virginia should have the discretion to establish its own WIP, without EPA passing judgment and usurping what is rightfully the state's role in this process.

IV. EPA's BACKSTOPS WILL NEGATIVELY IMPACT SMART GROWTH & ECONOMIC DEVELOPMENT

A. Smart Growth

Most major POTWs in the Chesapeake Bay watershed currently have allocations that were calculated using design flows and a TN concentration between 4 and 6 mg/L. In comparison, secondary treatment POTWs may discharge at a concentration of approximately 25 mg/L TN plus or minus. The generally-agreed upon limit of technology (LOT) for nitrogen removal at POTWs is 3 mg/L; thus, treatment at the 4-6 mg/L level is about 85%-to 95% of the maximum technically feasible reduction.

After making these major reductions, what remains is only limited capacity for POTWs to serve future growth in wastewater flows in the environmentally beneficial manner of using these advanced treatment facilities rather than to less effective on-site disposal systems ("OSDSs"). In contrast, the reductions reflected in EPA's TMDL could increase net (POTW+OSDS) nitrogen

[37] 33 U.S.C. 1370.

[38] Virginia law (Chesapeake Bay and Virginia Waters Clean-Up and Oversight Act) includes a provision for the development of a Bay clean-up plan. Va. Code 62.1-44.117.

loadings, harm smart growth, and cause environmental detriments associated with OSDS-based sprawl.[39]

The interaction between POTW and OSDS loads is of high importance when considering future growth. VAMWA has performed simple calculations to quantify the net increase in nitrogen loading that could result from reducing POTW allocations and directing the flow associated with the "lost" treatment capacity to OSDSs.

The conclusion based upon those computations is that reduction in the concentrations of POTW allocations could result in a net increase in total nitrogen loadings to surface water, even using denitrifying OSDSs. Some of the potential increase could be prevented by wastewater recycle/reuse, depending on land availability, demand for recycle water, and costs. However, these calculations underscore the importance of joint planning of POTW and OSDS loads in light of future growth. EPA's decision to cut POTW allocations in its Draft TMDL risks this future environmental impact.

B. Economic Development

Preserving current POTW allocations is also imperative for future healthy economic growth. Adequate sewer capacity is a critical part of future economic growth. If EPA's POTW allocations cuts stand, POTWs will not have the ability to serve additional customers, no matter their importance for Virginia's economic recovery.

While EPA points to the possibility of acquiring "offsets," the fact is that offsets are not widely available and thus not a viable option in Virginia on any meaningful scale. Further, offset development is only in an early developmental stage and is very expensive to implement.[40] To the extent that EPA believes POTWs will be able to avail themselves of non-point source offsets and thus be in a position to provide treatment capacity to new customers, VAMWA responds that offsets are not widely available at the present time and thus do not represent a viable option for planning, financing or constructing major public infrastructure.

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[39] See C. Bell and K. Dorken Paper (Calculation of Net Load Increases from Diverting Future Wastewater Flows to On-Site Disposal Systems Instead of ENR POTWS) (attached hereto as Appendix 20).

[40] Brent Fults, Managing Member of the Chesapeake Bay Nutrient Land Trust, LLC, a Virginia non-point source nutrient bank, gave testimony before the U.S. Senate, Committee on Environment and Public Works, Water and Wildlife Subcommittee on August 3, 2009 (attached as Appendix 21). According to Fults, "the costs associated with reducing nutrient loading by one pound from an acre of farmland can run into the thousands of dollars." This is because owners of agriculture land expect compensation for the costs of land conversation from agricultural use to forest plus the lost opportunity costs for not farming or developing the converted farmland.

V. EPA'S DECISION TO REJECT VIRGINIA'S EXPANDED TRADING PROGRAM APPROACH IS UNREASONABLE

Virginia's WIP includes provisions for expansion of its existing nutrient trading program. Virginia proposes to expand the trading program to include agriculture, urban storm, and others. An implementation of such an expanded trading program would provide the necessary flexibility to achieve cost effectiveness. EPA has acknowledged in recent public meetings that the TMDL does not consider affordability or cost-effectiveness. Unlike the EPA, local governments have a fiduciary responsibility to their customers to seek cost-effective solutions. EPA's disapproval of Virginia's WIP essentially eliminates the flexibility needed to serve the best interests of the public. EPA's action in this regard is unreasonable.

VI. EPA'S APPROACH TO JAMES RIVER IS UNREASONABLE

In the Draft TMDL, EPA has proposed drastic cuts to the James River allocations. This is the result of a remarkable confluence of technical and policy problems: an unstable, poorly-calibrated model forcibly applied to a scientifically dubious standard, itself partially based on prior model predictions of attainment under a completely different loading scenario. EPA has failed to offer a reasoned explanation for using the chlorophyll-*a* criteria as the basis for James River allocations in light of these unresolved issues. EPA's Draft TMDL is also missing evidence that there would be any quantifiable water quality benefit from the billions of dollars that would be required to comply with the allocations. The Draft TMDL validates and confirms VAMWA's long-held concern that the chlorophyll-*a* standard could result in mismanagement of the estuary. EPA's determinations on this issue are unreasonable and arbitrary and capricious. The following comments summarize the major problems with the chlorophyll-*a* standard and TMDL-related modeling:

A. The James River chlorophyll-*a* standards are scientifically flawed

The stringent nutrient allocations proposed by EPA are based on a standard that lacks a sound scientific foundation. VAMWA has been actively participating in discussions regarding chlorophyll-*a* since EPA's initially attempted to derive Bay wide criteria in 2000. Over this time, VAMWA scientists served on technical committees, contributed independent data analyses, and provided numerous sets of technical comments on chlorophyll-*a*. During the development of the Bay TMDL, VAMWA clearly communicated its concerns about the James River specific chlorophyll-*a* standards to the EPA.[41] The key points in that document are summarized as follows.

1. *EPA-led technical efforts concluded that numeric chlorophyll-a criteria were not technically supported* (2000-2003): An EPA process to develop Bay-wide chlorophyll-*a* standards pre-dated Virginia's adoption of the James River chlorophyll-*a* standard.

[41] See August 16, 2010 letter and attachments from VAMWA to EPA staff (attached hereto as Appendix 22).

Despite considerable efforts (including supporting technical work by VAMWA), the process ultimately showed that chlorophyll-*a* could not be quantitatively linked to designated use attainment at that time. The EPA ultimately recognized these deficiencies and made the appropriate decision not to publish Bay-wide chlorophyll-*a* criteria as part of the 2003 criteria document.[42] EPA eventually published a compilation of multiple lines of inquiry and encouraged States to use this information to develop site specific chlorophyll-*a* criteria where needed. VAMWA expressed concerns that the document did not sufficiently recognize the limitations and offered substitute language.[43]

2. *Virginia's derivation of chlorophyll-a criteria suffered from the same issues experienced by EPA (2003-2005)*: After the publication of the EPA criteria document, the Commonwealth of Virginia initiated a rulemaking process to establish chlorophyll-*a* criteria for the tidal portions of the James River. During this process, the VADEQ relied heavily on EPA's 2003 criteria document, and suffered the problems associated with it. Due to our familiarity with the deficiencies of the 2000-2003 EPA effort, we recommended that Virginia adopt an adaptive management approach that used monitoring and research to strengthen the understanding of relationships between chlorophyll-*a* and potentially harmful algal blooms.[44] When this course of action was not followed, VAMWA commented extensively on the subsequent criteria proposals[45] supported by literature reviews and data analysis. These technical issues associated with the numerical criteria were never satisfactorily resolved. Legislation was drafted by a member of the General Assembly that would require justification of tangible benefits to the environment and to the public. This was held in abeyance to encourage all parties to achieve a solution to the problem. That solution consisted of conducting a James River "Alternatives Analysis".

3. *The criteria ultimately adopted were a compromise partially based on model predictions of attainment under a specific set of loading assumptions*: During 2005, VADEQ (with EPA's assistance) performed a series of modeling analyses to evaluate chlorophyll-*a* reductions relative to various point source loading scenarios. The results from the Alternatives Analysis[46] were used to both adjust the proposed criteria adopted by the SWCB in 2005 (significantly in some cases) and establish point source nutrient allocations now contained in the Water Quality Management Regulation. These circumstances demonstrate that the existing chlorophyll-*a* standards represent a negotiated result contingent on (a) expectations of attainment under a specific set of

[42] Attached hereto as Appendix 23.

[43] Comments attached hereto as Appendix 24.

[44] Comments Attached hereto as Appendix 25.

[45] Comments Attached hereto as Appendix 26.

[46] Attached hereto as Appendix 27.

loading assumptions, (b) the status of the modeling framework at the time, and (c) other critical interpretation assumptions that were employed.

4. *The new EPA model does not address attainment or previous model assumptions*: During 2009-2010, as part of the TMDL process, the EPA's Chesapeake Bay Program Office revised the modeling framework and the other critical assumptions and re-evaluated chlorophyll-*a* attainment. The modeling results now predict much higher non-attainment rates for chlorophyll for the same given loading scenario agreed to in 2005. These results are now driving the EPA's present proposal for steep nutrient loading reductions for the James River. The key factors responsible for the increasing stringency are listed below:

    a. The watershed model (WSM) and its calibration were revised from WSM version 4.3 to WSM version 5. The watershed model is still presently undergoing modification at the time of this writing. WSM version 4.3 was calibrated to 1985-1991 hydrology while WSM 5 was calibrated to 1990-2000 hydrology. The newer hydrologic period tends to have higher loading rates as this period is wetter. The effectiveness of certain BMPs were also revised downward (achieve less nutrient reduction for each BMP).

    b. EPA changed its method for predicting attainment from direct use of the model results to a method that uses scenario results to transform observed data.

    c. Model output was evaluated for 3 year periods individually (8 in total) instead of a single 10 year period during the 2005 Alternatives Analysis.

    d. A rule was implemented to require non-attainment to be less than or equal to 1%. In the 2005 Alternatives Analysis, there was no stated rule and non-attainment rates of 4% were judged to be within the uncertainty band of the model, which EPA accepted as sufficient.

As previously stated, the James River chlorophyll-*a* criteria and associated load allocations are inherently linked to the model framework and analysis assumptions of 2005. EPA has essentially changed the rules of the game after the fact. It is likely that Virginia would have adopted different chlorophyll-*a* criteria, or may not have adopted any chlorophyll-*a* criteria, if EPA had demanded the interpretation rules described above during the 2005 time period.

B. VADEQ (and apparently EPA) recognized that the existing chlorophyll-*a* standards are imprecise and would require revision

The 2005 time period record is replete with statements that recognized the unreliability of the chlorophyll-*a* criteria and the need for future adjustment by both the VADEQ and EPA. As part of the public comments regarding the James River Alternatives Analysis, the VADEQ and EPA commented as follows regarding the state of the science regarding the chlorophyll standards:

> EPA…requests the [sic] Virginia fully consider new scientific findings and enhanced information on attainability in future triennial reviews of the Commonwealth's water quality standards regulations…DEQ acknowledges that the current state of the science for deriving numerical chlorophyll a criteria to protect these designated uses is not as quantitatively precise as that supporting other published criteria in terms of the exact concentrations at which adverse impairments to aquatic life are certain to occur. We believe that attainability can be factored into the final criteria to help us focus in on a number that is protective of aquatic life uses in these segments and reasonable. ….[47]

EPA's present insistence that the chlorophyll model results be interpreted in a strict and rigid manner is inconsistent with limitations of the standard acknowledged by EPA.

C. The James River chlorophyll-*a* model is flawed and is of questionable utility

The James River chlorophyll-*a* simulation has serious technical problems that, until resolved, should preclude its use to make major changes to existing load allocations. VAMWA has expressed these concerns on numerous occasions, including multiple requests for better calibration information and a critical review of EPA's allocation methodology.[48] The results of this review are summarized below:

1. *The James River chlorophyll-a model lacks a comprehensive review*: VAMWA can find no evidence that the James River chlorophyll-*a* model has ever been subjected to a detailed peer review specifically oriented to determining its utility for allocating loads based on chlorophyll-*a*. At most, any peer reviews appear to have been lumped in with an overall review of the WSM and WQSTM output, involving multiple parameters and scores of segments Baywide. Whatever peer review the model received, it obviously did not adequately address the James River chlorophyll-*a* model, as evidenced by the fact that major calibration and behavior problems with the chlorophyll-*a* simulation were not recognized or acknowledged by EPA until the summer of 2010. Given the magnitude of regulatory and cost implications of the James River chlorophyll-*a* simulation, a comprehensive peer review is absolute essential.

2. *The James River chlorophyll-a model exhibits poor behavior*: EPA has recognized certain model calibration and post-processing issues. These issues include obviously erroneous calibration in certain segments and seasons, post-processing problems associated with regressions and scenario-transforms, unexplained model anomalies, and leverage of a few data points in the data transformation process. For example, EPA has noted instances where decreased loadings resulted in increased chlorophyll-*a*. However, no evidence was presented that EPA conducted a more comprehensive review of these same issues in all segment-season conclusions, determined the extent of the anomalies, or fully evaluated

[47] Materials from Final Regulation Agency Background Document (Nov. 21, 2005).

[48] A comprehensive list of VAMWA's requests is attached hereto as Appendix 28.

the predictive capabilities of the model. VAMWA is concerned that similar but undetected problems may have occurred elsewhere that would have affected the results, but that EPA did not develop or apply a system or criteria to adequately address the model and its use.

3. *The EPA has failed to adequately calibrate the James River chlorophyll-*a *model, or even to rigorously evaluate the calibration*: In the recent history of the James River allocation effort, VAMWA has repeatedly asked for a rigorous review of the model's calibration. To date, EPA has refused this request, and appears to be in denial regarding both the quality of the calibration and need for a more rigorous evaluation. Following is a brief history of recent (2009-2010) activity related to the chlorophyll-*a* calibration:

    a. In early 2009, the CBPO began to produce preliminary chlorophyll-based stoplight plots for the technical work groups, prior to any focused evaluation of the model's calibration.

    b. In materials for the May 2009 teleconference between EPA, VADEQ, and VAMWA, EPA included a tabulation of non-attainment rates according to monitoring data and the linked Phase 5.1 WSM and WQSTM,[49] presumably to allow evaluation of the agreement between observed and modeled non-attainment rates. However, subsequent review of this table by VAMWA revealed that it was not at all useful for this purpose, because under the EPA's data transformation approach (i.e., "scenarioing" of the data), there should be no differences between the observed non-attainment rates and the "base case" modeled non-attainment rates. The differences that were tabulated were apparently due to difference in the stations used to tabulate monitoring results versus scenario'ed model results.

    c. In the May 2009 teleconference between EPA, VADEQ, and VAMWA, it was agreed that an EPA action item should be to "closely evaluate the Bay water quality/sediment transport model calibration for the tidal James River."[50]

    d. In three subsequent teleconferences between EPA, VADEQ, and stakeholders (held in September, October, and December 2009), there were neither materials nor discussion to indicate that EPA had performed a rigorous examination of the James River model calibration. Rather, EPA's analyses had focused on other topics such as the biological reference curve and log-transformation issue.

    e. In the December 2009 teleconference, VAMWA discussed results of its own review of the model calibration, based on longitudinal and time-series plots from Modeling Subcommittee meetings. The review indicated that the model severely

[49] Attached hereto as Appendix 29.

[50] Reference attached hereto as Appendix 30.

underestimated chlorophyll-*a* in the tidal freshwater segments and failed to predict the correct magnitude of interannual variations. In the lower estuary, the model tended to overpredict spring blooms and also failed to predict the correct magnitude and direction of interannual variations. This raised serious questions regarding whether the model algorithms were useful for predicting how management scenarios would affect chlorophyll-*a* attainment.

f. In the December 2009 teleconference, VAMWA verbally requested that EPA perform a rigorous evaluation of the model calibration, to which EPA verbally agreed. VAMWA followed the verbal request up with an e-mail on January 4, 2010[51] that specifically requested tabulation of observed versus model-predicted "chlorophyll-a means and attainment rates, without the data transformation, by three-year period and also by individual year." Neither the verbal nor the email request were answered by EPA.

g. EPA planned the next James River teleconference for February 2010. The distributed agenda made no mention of the model calibration. VAMWA sent an email to request that discussion of the calibration be added to the agenda.[52] In response, EPA indicated that they ultimately intended to perform the calibration evaluation, but would not have time to perform it by the February teleconference.[53] This was the last EPA-led, James-specific teleconference to which VAMWA and other stakeholders were invited.

h. VAMWA repeated the email request for calibration tables on June 2, 2010, as part of a larger information request.[54] EPA never responded to the request.

i. As the June 2010 deadline for draft allocations approached, EPA released materials for a June 14, 2010 co-regulators teleconference and a June 18, 2010 James-specific conference call to which stakeholders were not invited. These materials included chlorophyll-*a* non-attainment diagnostics and the basis for the draft James River nutrient allocations. These materials indicated that, for the first time, EPA had recognized and acknowledged some calibration problems with the model. However, there was no evidence presented that the EPA had performed true evaluation of the calibration or improved the calibration at all. For example:

    i. EPA's review of the James River chlorophyll-*a* calibration appears to have been limited to visual inspection of charts. They apparently never

[51] Attached hereto as a part of Appendix 28.

[52] Attached hereto as a part of Appendix 28.

[53] Attached hereto as Appendix 28.

[54] Attached hereto as a part of Appendix 28.

tabulated calibration statistics nor performed a rigorous examination of determine how well the model predicted the magnitude and direction of interannual variation in different segment-seasons.

ii. EPA did not determine the reason for the poor calibration, nor adjust the calibration. Rather, EPA's response to the poor calibration was to "cross out" model results from segment-seasons that had most obviously flawed calibration (tidal freshwater and polyhaline summer). Specifically, EPA found that when it used data from the September 1999 timeframe, chlorophyll-a concentrations were going up rather than going down as loads were reduced (see Figure 1 below). But rather taking the time to find and correct the source of the problem, EPA simply eliminated the September 1999 data to produce the result it was seeking. Further, EPA has offered no explanation for why the model was not working properly nor has it offered a justification for deleting the data. If EPA is going to disqualify data, it should at least explain why it is being disqualified.

iii. EPA apparently had no objective criteria for determining in which segment-seasons the calibration was adequate.

iv. Despite the poor calibration in the tidal freshwater Spring, EPA picked one year (1995) among ten (1991-200) for which it deemed the calibration adequate, and used this as a basis for load allocation. This contravenes accepted modeling practices.

"Anomaly in some driver of the model simulation that caused poor scenario performance in the latter half of September 1999 at LE5.2"

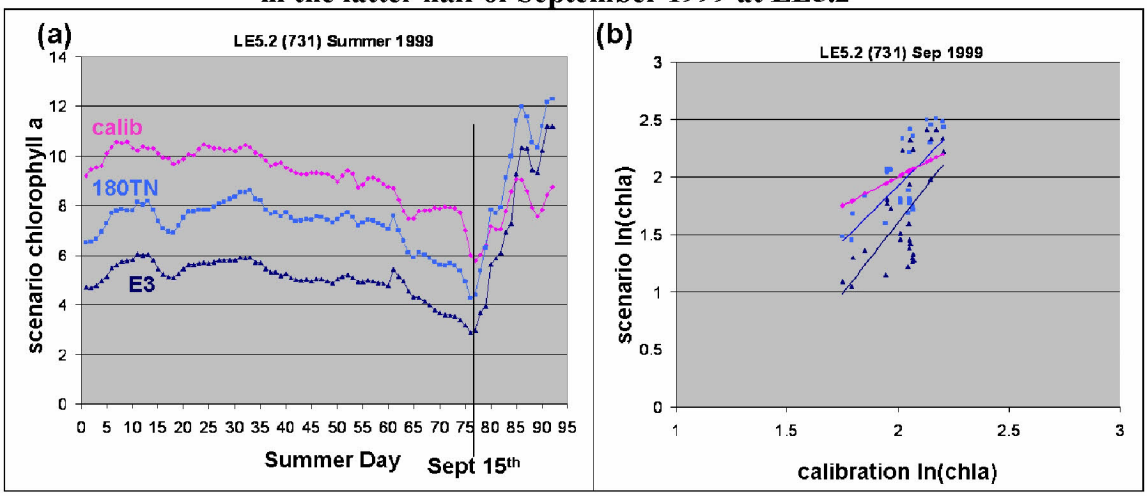

Figure 1[55]

Figures 3 and 5 (Appendix O) presented in the Draft TMDL provide time series plots of simulated versus observed chlorophyll-*a* in the tidal fresh and mesohaline James River for selected model grid cells. These figures themselves demonstrate that the model still does not have the ability to capture inter-annual variability. Because annual and smaller time simulations of chlorophyll-*a* influence the TMDL, it is essential that the model have the ability to simulate chlorophyll-*a* at these smaller scales (*i.e.*, variation within individual 3 year periods). EPA's insistence that the results be evaluated as individual 3 year periods (rather than as 10 year period in the 2005 James River Alternatives Analysis) significantly magnified the effect of poor interannual model performance on the TMDL.

In summary, EPA held numerous teleconference and meetings, including five teleconferences specific to the James River, without fulfilling repeated requests and agreements to perform a rigorous evaluation of the model calibration. In the rush to meet the allocation deadline, EPA applied a poorly calibrated model in a highly arbitrary fashion that contravenes accepted modeling practices. To this day, EPA appears to be in denial regarding the quality of the James River model calibration and the need to fully evaluate it.

[55] See Draft TMDL, Appendix O, Figure 6. Plot of simulated surface chlorophyll a concentrations for WQM cell 731 (location of station LE5.2) during the summer of 1999 (a), and resulting regression plot for September 1999 LE5.2 chlorophyll a (b). The quote above Figure 1 is from Appendix O, at p. O-5.

4. *EPA has not been responsive to VAMWA's requests for information on model calibration and results*: VAMWA has been concerned about the chlorophyll-*a* model issues since the early stages of TMDL development. In an attempt to help address these concerns a number of timely model related data requests were made of the EPA Chesapeake Bay Program Office on January 4, June 2, and August 3, 2010.[56] In addition to the previously-mentioned requests on model calibration, we have requested documentation on predicted non-attainment by model scenario and post-processing regression results. However, these requests have not been answered at the time of this writing. Our ability to effectively comment and offer problem solutions was limited as a result and the transparency of the TMDL development process was inadequate.

   On a related note, in addition to making it difficult to follow the development of the Draft TMDL, EPA's Draft TMDL itself is lacking in adequate detail to allow for a thorough review of these modeling issues. EPA has made it extremely difficult to evaluate the differences between the model runs. In Appendix O to the TMDL Report, EPA only states that it post-processed (manipulated) the data to address the poorly performing model results associated with the "James LOE ½ Potomac" model scenario. However, based on a review of EPA's "stoplight plots" for chlorophyll-a in Table M3 of Appendix M to the TMDL Report, it appears that EPA post-processed only the "James LOE ½ Potomac" scenario and failed to post-process the remaining scenarios. VAMWA submits that EPA should have post processed and published scenarios with higher allocations in the James to allow for a public review of the results and the relative attainment rates for different load allocations.

[56] See Appendix 28.

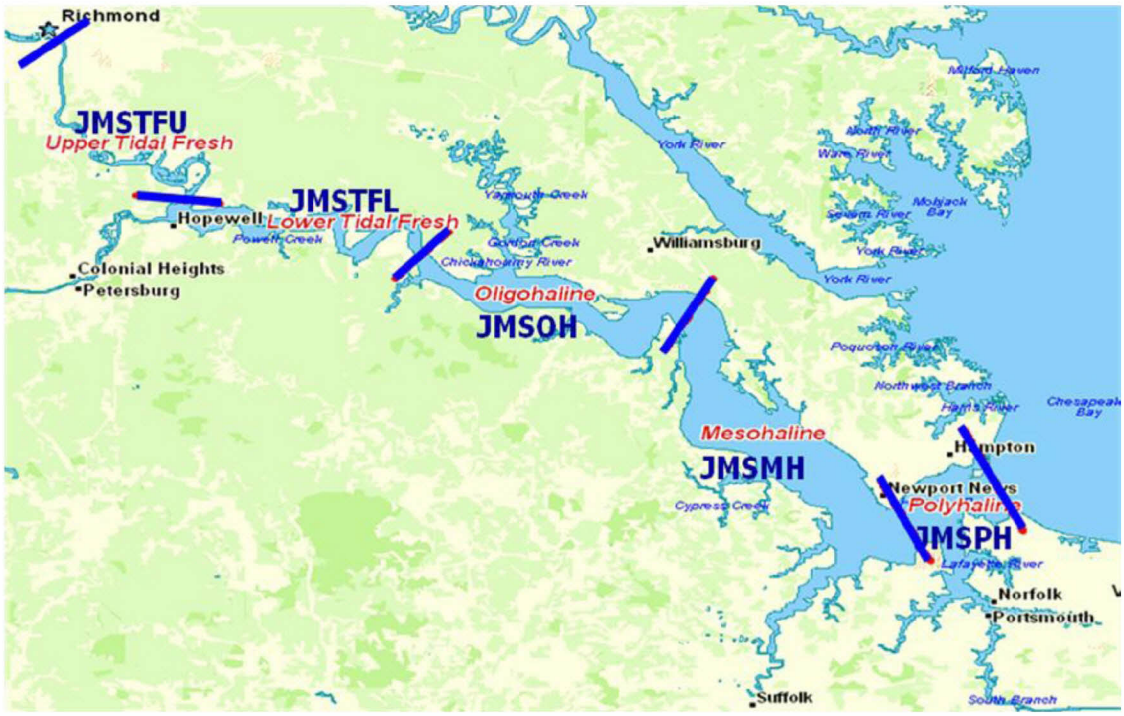

Figure 2: James River Model Segments

Until EPA recalibrates the model and the model is verified with enough peer review to ensure appropriate reliability in establishing reasonable allocations for the James River Basin, the allocation should remain at the "Tributary Strategy" level.

D. EPA's justification for drastic load reduction hinges on insignificant water quality responses

Due to the lack of complete information on the model results, it was difficult to determine the level of water quality benefits that EPA expected from the large load reductions. However, VAMWA interpreted the limited information available,[57] mostly derived from a June 18, 2010 presentation. Results of this review revealed that EPA was recommending huge allocation cuts on the basis of tiny model-predicted shifts in chlorophyll-*a*. Specific conclusions of Bell and Hunley (2010) were as follows:

1. *The predicted changes in chlorophyll-a are smaller than can be precisely quantified by the model*: Based on a review of Appendix O TMDL materials, CBPO's justification for going beyond the 190 TN / 13 TP allocation level is to reach very small and predicted decreases in chlorophyll-*a* and non-attainment rates:

[57] Attached hereto as Appendix 31.

- 2-3% reductions in non-attainment in selected segment seasons (JMSTFL, JMSMH)
- 1-2 micrograms per liter (ug/L) reduction in chlorophyll-*a* in selected segment seasons[58]

It is a misapplication of the model framework to claim that it is capable of distinguishing between model scenarios at such small differences in percent attainment and ambient chlorophyll-*a* concentrations, or that major management decisions costing hundreds of millions of dollars be made based on these tiny predicted shifts. Given the strong implicit margin of safety of the Bay TMDL, it *cannot* be concluded that the model is precise enough to distinguish non-attainment between scenarios that predict 0-1% and 2-4% non-attainment. The precision of chlorophyll-*a* predictions can be expected to be significantly less than that for main stem Bay dissolved oxygen (D.O.), which enjoys a much better calibration.

If the model cannot distinguish between D.O. non-attainment rates of 0% and 1% (as acknowledged by EPA), the spread in distinguishable non-attainment rates for chlorophyll-*a* can be expected to be greater. On this particular point, VADEQ (2010) provides a comparison between chlorophyll and D.O. reliability with respect to a number of different metrics including: impairment confidence, criteria evolution, criteria metric, analysis method, data quantity, analytical method variability, environmental variability, and model prediction ability.[59] Their comparison indicated that chlorophyll a measurements are considerably less certain in all areas than D.O. The obvious implication is that the allowable percentage non-attainment for chlorophyll is greater than 1%.

2. *The predicted changes in chlorophyll-*a *are smaller than those that can be detected in monitoring data:* It can be demonstrated that tiny predicted shifts in chlorophyll-a between the 190 scenario and the "between 170/Potomac" scenario (i.e. EPA's proposed allocation) would not even be detectable in light of environmental, sampling, and analytical variability. For example: (a) power analysis demonstrates that even after long (25 year) monitoring periods, the minimum significant difference (MSD) in seasonal mean chlorophyll-a would be in the 2-4 ug/L range for most attaining segment seasons.[60] Thus, the modeled shift in chlorophyll-*a* between the 190 and the "between 170/Potomac" scenario would not be detectable in the monitoring data; and (b) based on a review of laboratory split sample results for the 1991-2000 James River data obtained from the CBMP data hub, the median relative percent difference (RPD) in chlorophyll-*a* samples was about 16 percent, corresponding to 1-4 ug/L chlorophyll-*a*, depending on

[58] See Attachment A of Bell and Hunley (2010) (attached hereto as Appendix 32) for details of these calculations.

[59] Attached hereto as Appendix 33.

[60] See Attachment B of Bell and Hunley (2010) (Appendix 32).

segment and season.[61] Thus, analytical variability alone is equal to or greater than the modeled shifts in chlorophyll-*a* between the 190 scenario and the "between 170/Potomac" scenario. Consideration of field (sampling) variability would cause the total variance of chlorophyll-*a* measurements to increase even further. The management implication is that the water quality response in the James River between the D.O. based allocation and EPA's backstop allocation would be essentially the same but with significant differences in source controls and cost to the citizens of the Commonwealth.

3. The *predicted changes in chlorophyll-*a *are not ecologically significant*: The difference in chlorophyll-*a* levels predicted between tributary strategy and the proposed reduced allocation scenarios (on the order of 1-2 ug/L seasonal average and 2-4% in terms of nonattainment rates) are exceptionally small in magnitude. This estimated level of change is too small to be seriously considered a matter of practical importance or consequence to the James River. Even if the model could adequately discern such differences (which VAMWA disputes as discussed above), they would not result in tangible environmental benefits. One must keep in mind that the resulting chlorophyll-*a* standards were acknowledged by VADEQ and stakeholders to be highly imprecise.

4. *James River chlorophyll-*a *concentrations are predicted to be relatively insensitive to nutrient load reductions in key segment-seasons*: Very large reductions in nutrient loading would result in only very small incremental reductions in chlorophyll-*a* concentrations and/or reductions in non-attainment rate. For example the critical segments of the tidal freshwater and lower estuary are predicted to have response rates of approximately 1.0 and 0.3 ug/L chlorophyll response per million pounds of TN reduction per year. Such a misapplication of the modeling framework would lead to huge expenditures without significant changes in standards attainment or tangible environmental improvement.

5. *Similarly, differences between the "Tributary Strategy" and TMDL scenarios are predicted to be very small*: Appendix 34[62] includes a series of four tables ("stoplight plots") for the "91-00 Base", "Tributary Strategy", "190/12.7 Loading", and "James LOE ½ Potomac" scenarios for each of the three-year rolling average for the periods between 1991 through 2000 that EPA uses to assess compliance. Each table includes percent non-attainment of the chlorophyll-a water quality criteria for each of the five model segments of the James River shown in Figure 2. The blacked data points shown in Appendix 34 for the JMSTFL and JMSPH segments in the "James LOE ½ Potomac" model scenario represent chlorophyll-*a* model output that was not considered reliable by EPA. Once post-processing of the data was completed, the JMSMH segment showed only 1% non-attainment, which EPA indicated was sufficient to establish the James River basin allocations for TN and TP loads at 23.5 and 2.35 million pounds per year, respectively. However, there are no records in the TMDL Report or its appendices for the percent non-

[61] See Attachment C of Bell and Hunley (2010) (Appendix 32).

[62] Data extracted from Table M3 of Appendix M to the Draft TMDL.

attainment for the JMSMH segment prior to the post-processing for the '97-'99 or '98-'00 summer periods shown in Appendix 34. Therefore, we have undertaken the analysis below to compare the scenarios.

Appendix 35 shows the same four scenario tables ("stoplight plot") as provided in Appendix 34, except the post-processing of the data for the "190/12.7 Loading" scenario was applied based on the EPA's June 2010 presentation. Appendix 35 shows that JMSTFL and JMSPH segments were also not considered reliable by EPA and removed from consideration. EPA reported that the percent non-attainment for the JMSMH segment was reduced from 15 percent in Appendix 34 to 4 percent in Appendix 35, which was based on the EPA's removal of the problem regression data. It is reasonable to assume that the same trend would exist for the "Tributary Strategy" Scenario as shown in Appendix 35. The post-processed "Tributary Strategy" percent non-attainment rate for the JMSMH segment would be expected to be about 1 percent higher than the "190/12.7" scenario (based on comparison between Appendix 34 and Appendix 35). Therefore, it would be expected that the "Tributary Strategy" data would attain the standard about 93 to 94 percent of the time. The difference between this attainment rate and the one percent rate that EPA used to develop the proposed allocations are "essentially equivalent" (refer to previous comments above).

E. The historical chlorophyll-a monitoring data are too limited to support the TMDL

The level of data is inadequate for assessment according to EPA guidance. Data from the monthly fixed site data collection program from 1991-2000 was used as the TMDL base-line. Although the data is considered appropriate for monitoring of general status and trends (for which it was designed), it is considered too coarse to reliably support a TMDL with such high cost implications. For example, most James River segments are characterized by only 2 stations per river segment per month and the TMDL is constructed to address each water body segment individually. Because chlorophyll-*a* has been shown to be spatially patchy and dynamic [63] basing the segment interpolation (the basis for non-attainment calculations) on only a few stations would lead to unrepresentative results (see example in Figure 3) – especially during periods that the algae blooms are initiating, peaking, or dissipating. Because of these issues, the EPA has established in guidance that an "adequate" assessment of chlorophyll-*a* should employ a combination of fixed sites and DataFlow (EPA 2003). Also, according to EPA 2003, "*the uncertainty associated with assessment of chlorophyll a criteria attainment using only the fixed station monitoring program would be expected to be quite high.*"

[63] See EPA 2003 (attached hereto as Appendix 23).

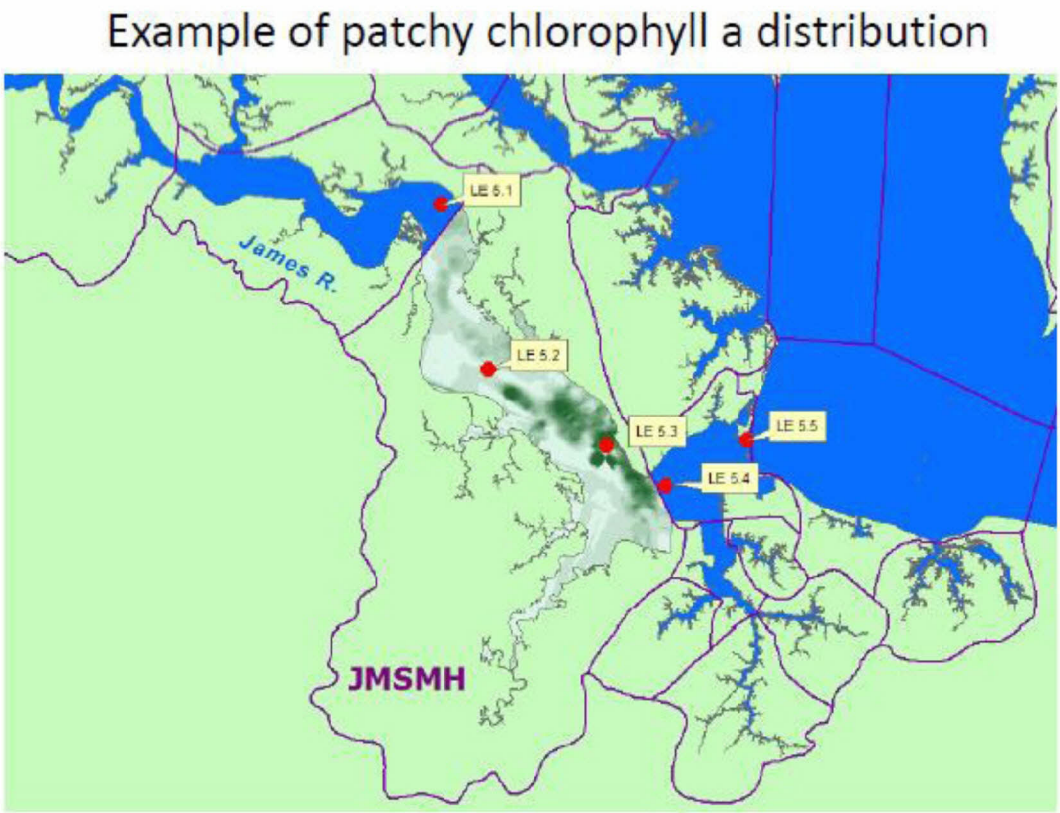

Figure 3

To address these issues, one of VAMWA's members, HRSD, has been conducting weekly DataFlow (DFLO) on the lower James River (JMSMH and JMSPH) segments since March 2005. Monitoring of the LAFMH and ELIPH segments was added in March 2008. The Virginia Institute of Marine Science has been conducting DFLO cruises on JMSTF1, JMSTF2, and JMSOH segments on a monthly schedule. The VIMS and HRSD DFLO data, made available on the Virginia Estuarine and Coastal Observing System (VECOS) http://www2.vims.edu/vecos/ in combination with traditional fixed sites, have been used by the VADEQ in order to improve the reliability of the resulting assessment. To evaluate the effect of the DFLO data collection on the regulatory assessment of James River chlorophyll standards, the VADEQ assessed the 303(d) results both with and without DFLO information.

The most recent results from the draft 2010 Integrated Report indicate that the regulatory outcomes (*i.e.,* pass-fail) remained the same. However, non-attainment rates were consistently reduced by DFLO in all of the James River segments by an average of 6% (Figure 3a). The potential impact associated with the use of DFLO on the TMDL dataset (1991-2000) is not possible to determine because the DFLO technology did not exist at the time. However, the comparison above suggests that the use of only fixed-site data in the TMDL caused the

allocations to be lower (and predicted non-attainment higher) than would have resulted if data would have been collected as EPA recommends. If DFLO is required for a chlorophyll-*a* water quality standards attainment assessment to be adequate, failure to include DFLO data will result in an inadequate attainment assessment.

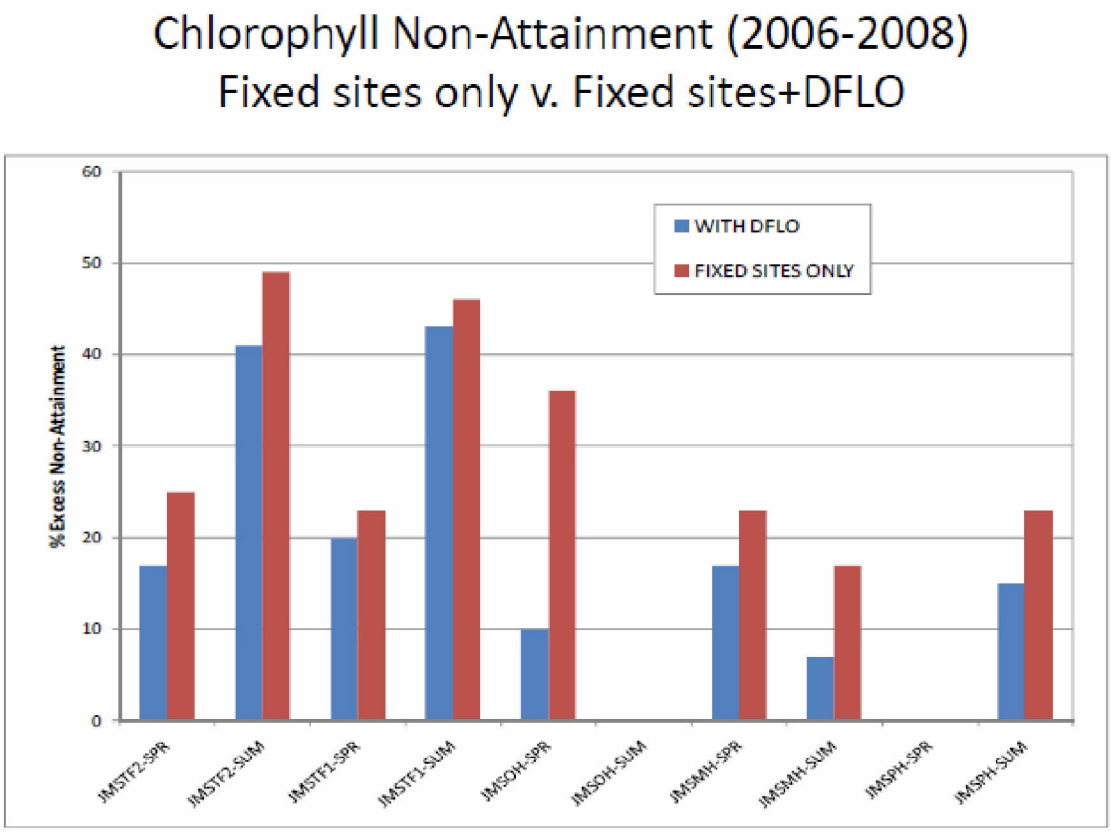

Figure 3a

Differences in non-attainment rates (between fixed sites and DFLO) are believed to be due to the number of sampling points evaluated and their relative influence on the resulting spatial interpolation step used in the assessment. Experience has shown that weekly data collections with DFLO data are essential to adequately capture bloom dynamics (initiation, peak, and dissipation) over the dimensions of space and time under which they occur. Improvement resulting from the use of DFLO data varies from cruise to cruise depending on the level of "patchiness" observed in chlorophyll-*a* distributions.

F. Chlorophyll-*a* conditions in the lower estuary do not correlate with nutrient reductions accomplished to date

Dauer and others (2008) provide an analysis of long term trends and nutrient loadings for the James River from 1985 to 2007.[64] The results indicated increasing chlorophyll-*a* trends in the James River mouth (JMSPH segment) and no trends in the JMSMH segments. These increasing trends in chlorophyll-*a* exist despite considerable progress made in achieving point source nutrient reductions below the fall line. As shown in Figure 4, below fall line PS TN loads decreased from approximately 22.5 mpy in the mid 1980's to about 12.5 mpy in the most recent 5 years (~44% reduction). Reductions in below fall line PS TP loads decreased approximately 2.5 mpy (77% reduction). These trends are consistent with Chesapeake Bay Model runs that compare 1985 and 2007 Progress point source nutrient loads below the fall line. Dauer and others (2008) report those reductions as 38% for TN and 74% for TP. This level of nutrient reduction is considerable and represents capital expenditures of hundreds of millions of dollars without improvements in chlorophyll-*a*, which is the indicator being used to represent designated uses in regards to nutrients.

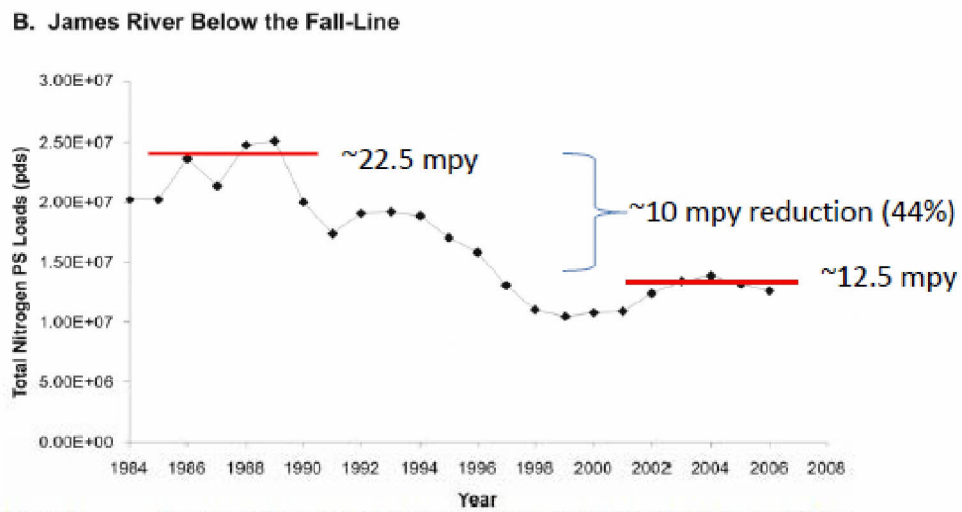

Figure 4. Long-term changes in point source total nitrogen loadings A. Above the Fall-line, and B. Below the Fall-line in the James River for 1985 through 2006. Loadings presented are from data reported to the Virginia Department of Environmental Quality directly from point source dischargers.

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Adapted from Dauer and others (2008)

[64] Analysis attached hereto as Appendix 36.

The available monitoring data brings into serious question the ability to predict chlorophyll-*a* levels in the lower James River with existing models. It is necessary to gain a better understanding of the system's drivers given the level of uncertainty that presently exists with regard to expected response. One critical area of research is the chlorophyll-*a* response in the James River associated with point source projects planned to meet the 2005 Water Quality Management Regulation. These nutrient controls are scheduled and will be completed by 2011. This offers an excellent full-scale opportunity to further study the effects of additional point source nutrient reduction on chlorophyll a levels and response of HABs. These efforts along with the stated needs for improving the chlorophyll *a* standards are fully consistent with the principles of adaptive management supported by EPA.

G. Recent monitoring data shows that higher allocations than those proposed by USEPA may achieve chlorophyll-*a* standards in the lower James River region

As part of the James River TMDL chlorophyll-*a* analysis, EPA recommended that the chlorophyll-*a* criteria assessment be changed from arithmetic averages to log-transformed (*i.e*, geometric) means. The VADEQ evaluated the effect of this methods change on 2008 and 2010 303(d) Water Quality Assessments (VADEQ, 2010).[65] Their results indicated that the non-attainment rates decreased substantially for the lower James River region. The revised results for the 2010 Assessment (for years 2006-2008) indicated 99-100% attainment for the lower James River segments. Based on these observed results VADEQ believes that the "dissolved oxygen based" James River allocation (TN=26.79 mpy; TP=2.69 mpy) would also attain the chlorophyll-*a* standard in this region. According to our analysis the lower James River would likely attain chlorophyll standards at a much higher level of loading than the dissolved oxygen based allocations because model estimates of 2006-2008 delivered TN loads for the James River ranged from 35 to 36 mpy respectively. Source: http://www.chesapeakebay.net/data_modeling.aspx. This considerably higher level of loading was associated with near attainment (99-100%) with chlorophyll standards. These results also demonstrate that our previous recommendation to establish the James River allocations at "Tributary Strategy" level is more than environmentally conservative.

EPA has not provided appropriate justifications for additional reductions in allocation below "tributary strategies." In fact, EPA's position on this point is directly contrary to its own approach used to find the Potomac and Anacostia Rivers in compliance with its chlorophyll-*a* standards. In the case of the Anacostia River, EPA used an existing non-attainment rate of 4% in the monitoring data to determine compliance based on "other lines of evidence."[66] EPA's inconsistency in conclusions here between the Potomac and James rivers demonstrates the arbitrary nature of the EPA's TMDL.

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[65] Attached hereto as Appendix 33.

[66] Draft TMDL, Sec. 6 at 40.

H. The TMDL does not acknowledge and accept Virginia's proposal to revise the chlorophyll standards and improve the modeling framework

Appendix 2 of Virginia's WIP contains a Draft James River Chlorophyll-*a* study plan. VAMWA concurs with and supports the need for the stated tasks. Successful completion of this study plan is considered essential to address the stated deficiencies of the standard and the associated modeling framework that are referenced in these comments. EPA has ignored the importance or implications of this study in the Chesapeake Bay TMDL. The existing allocations listed in the EPA TMDL for the James River based on chlorophyll-*a* (23.48 mpy TN, and 2.340 mpy TP) should be replaced with allocations consistent with Tributary Strategies. EPA's TMDL should include the chlorophyll-*a* study in the TMDL. However, EPA must clearly state the level of unreliability that exists with the present chlorophyll-*a* standard and the modeling results in the TMDL document.

I. Filter feeders and menhaden offer another means to address chlorophyll-*a* compliance on the James River

We support EPA's efforts to consider the role of Atlantic menhaden in relation to management of chlorophyll-*a*. Recent modeling work has shown that their migration into the tributaries and associated consumption of algae has the potential to affect chlorophyll-*a* and associated compliance with the standards. We agree with the statement included in TMDL Appendix U "Although the influence of menhaden on water quality is estimated to be less than that of oyster filter feeders, even a small percentage of nutrient assimilation or chlorophyll reduction in the Chesapeake Bay would ease the pressure in meeting 2-year milestones." Menhaden stocks do not dramatically reduce chlorophyll as long term averages but their incremental effects are considered comparable to nutrient reduction.

VAMWA recommends that additional analyses be conducted to evaluate menhaden effects on seasonal peaks and/or worst years in the record. Further, additional modeling enhancements need to address menhaden migration and residence time variability according to a food gradient. A number of papers indicate that menhaden consumption of algae increases in areas with higher chlorophyll-*a*. This is logical because the species would remain longer in an area with greater availability of food. Because the model does not presently capture these foraging effects the available reductions in chlorophyll due to menhaden (especially during bloom conditions) would be under-estimated.

VII. EPA'S BAY MODEL IS FLAWED

A. EPA Should Correct A Number of Modeling Issues

EPA expects VAMWA members (and others) to comply with an extraordinarily expensive clean-up plan. However, EPA itself has not fulfilled its obligation to ensure that its modeling framework is adequate to support its TMDL and the accompanying WLAs and LAs. If EPA presses forward with finalizing the TMDL over the objections of Bay dischargers and interested

stakeholders, despite the faulty model that it has put forth in support of its TMDL, its decision to do so will be arbitrary and capricious.

Like any model, EPA's Bay model is a highly imperfect representation of reality. Over time, EPA has inappropriately shifted to using it in ways that are beyond its capabilities (e.g., predicting D.O. concentrations and non-attainment rates in specific segments to the single percentage point level under far-reaching management scenarios). This has resulted in wide swings in predicted loads and goals with each major model version. VAMWA believes that this instability will continue to occur in the future as the model is periodically modified.

VAMWA objects to overreliance on unstable models to the single percentage point of output, such that environmental policies are undermined with each new model run. Following are examples of problematic modeling issues that should cause EPA to shy away from major disruptions to state regulations/policy on the basis of single-digit shifts in model output:

1. *Lack of full model validation and peer review*: The Scientific and Technical Advisory Committee (STAC) has placed a strong emphasis on the need for model validation (STAC, 2006), calling validation "an essential and a required step in model development, particularly if the model is to be used for TMDL development purposes" (STAC, 2008b).[67] Although the watershed model (WSM) appears to have been subjected to some kind of validation, the public documentation of the validation is very poor. Moreover, it is unclear if the Water Quality and Sediment Transport Model (WQSTM) has been validated in any manner. VAMWA scientists were unable to locate any record of WQSTM validation in Chesapeake Bay Program materials. It also appears that the STAC reviews of the WQSTM have focused on the sediment, clarity, and SAV components, and there may not have been a complete peer review of the latest version of the full eutrophication and DO simulation.

2. *The model is being extrapolated beyond the observed range of management controls and living resources*: The model framework has been calibrated using data from years with widely varying hydrologic conditions. However, none of the calibration data are representative of management controls or living resources that being called for as part of the Bay TMDL and related goals. Therefore, there is simply no way to verify that the Bay system will respond precisely as predicted. The model predictions of attainment are best characterized as rough approximations rather than highly precise predictions.

3. *An estimate of model uncertainty should be used to determine the essential equivalence of model scenarios*: EPA was correct to implement an interpretive rule (the "1% rule") by which model-predicted non-attainment is considered indistinguishable from zero. However, the one-percent magnitude underestimates the model error and overestimates the precision of both the model and monitoring data. Based on the analysis of Bell

[67] Attached hereto as Appendix 37.

(2010b), segments that are close to attainment would require spatial D.O. violation rates that differ by 4% or more before they would be statistically distinguishable from one another. EPA's justification for the 1% magnitude was not based on calibration or validation statistics, but by an analysis of the sensitivity of simulated to DO attainment to simulated load reductions.[68] It is recommended that the EPA further evaluate the statistical power of the model and monitoring to distinguish between non-attainment rates of differing magnitude. With the information in hand, VAMWA concludes that the "1% rule" should be a "4% rule" at minimum.

4. *Inaccuracy of groundwater inputs*: The model handles groundwater inputs/loads in a very simplistic manner that is dissimilar to physical reality. Or as stated by STAC (2008a), "the model does not represent the full coupling of the groundwater to the surface water system on a regional scale." Considering that 50% of the total freshwater flow to the Bay is derived from groundwater (Bachman and others, 1998), this is a major model limitation and source of uncertainty for management scenarios.

5. *Lack of criteria for acceptance of model predictions*: Predictions of dissolved oxygen and chlorophyll-*a* in some segments are characterized by anomalies (e.g., counterintuitive trends with decreasing loads). EPA recognized many of the most obvious problems, and used poor model behavior as a justification for not using DO or chlorophyll-*a* attainment in many segment-seasons (e.g., Keisman, 2010a; Keisman 2010b).[69] However, in most of these cases, the underlying cause(s) were not identified, and full implications of these problems for the model were not explored. The same problems that caused obviously poor model behavior in some segment-seasons might be also causing more widespread but less obvious problems in other segment-seasons. We see no evidence that the CBPO developed objective criteria for the acceptance or rejection of model results in these circumstances. Poor behavior of the James River chlorophyll-*a* model is discussed in more detail in Section VI.

6. *Poor chlorophyll-a calibration*: The chlorophyll-*a* calibration is obviously very poor in many segments (e.g., tidal freshwater James), and EPA has not demonstrated that the model is a useful predictor of annual changes in chlorophyll-*a* in other key segment-seasons. This comment is discussed in more detail in Section VI.

7. *Instability and inaccuracy in urban land use assumptions*: The watershed model suffers from questions regarding accuracy of the urban land use acreages. Urban land use breakdowns have been very unstable between model versions and even subversions, varying with different derivation methods and assumptions. For example, the urban land

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[68] Batiuk, R. and Shenk, G., 2010. Technical Rationale for Documenting Attainment for 1% Non-attainment Dissolved Oxygen Criteria Values. Attachment C2 for State/District Co-Regulators June 14, 2010 Conference Call (attached to Appendix 41).

[69] Attached hereto as Appendix 38; see also Appendix 31.

use breakdown varied by millions of acres between model version 5.2 and 5.3.[70] It unclear that the latest version is accurate or has been adequately ground-truthed. Urban stormwater loads and implementation costs are highly sensitive to the assumptions regarding urban land use breakdown.

8. *Missing point sources*: It is our understanding the current version of the model framework does not include 139 active Virginia point sources. Further, EPA is aware of this error, however it has not been corrected due to a lack of time until EPA's self-imposed December 31, 2010 deadline.

9. *Inappropriate application of watershed model to local level*. In their review of the Phase 5 watershed model, STAC (2008) clearly stated that the model was not appropriate for use at the local level, and would need recalibration/resegmentation for this application. It is unclear, then, why the Bay Program is continuing to promote the application of the model to determine local-level loads and allocations, and why EPA is calling for such values in the Phase II WIPs.

10. *Overparamterized modeling framework*: The model combined modeling framework is so complex and highly parameterized that there are no unique calibration solutions; it is easy to obtain the "right" answer for the "wrong" reason. Calibration also relies on regional calibration factors that act as "black box" knobs, divorcing the model result from physical understanding of the processes. While necessary for calibration, these factors introduce yet another source of uncertainty into model predictions.

11. *Inconsistent watershed model results*: We understand that a consultant retained by another stakeholder has run the watershed model has obtained widely different results on different computers. If true, this brings into question which is the "correct" result, and undermines the entire basis of the TMDL allocations. We encourage the Bay Program to fully investigate the reasons and implications of this finding.

B. EPA's Critical Period Is Appropriate

VAMWA concurs with EPA's decision to use 1993-95 as the critical period for the nutrient TMDL.[71] This period had relatively high winter-spring inflows, but not so extreme that the TMDL would be based on an extremely rare hydrologic event. A TMDL based on 1993-95 hydrology will be protective under the great majority of hydrologic conditions.

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[70] See Appendix 39.

[71] See July 16, 2009 Technical Memorandum from C. Bell to C. Pomeroy (Analysis of January-May Inflows to the Chespeake Bay during the 1996-98 Period) and follow-up materials (attached hereto as Appendix 40).

C. EPA's Use of An Implicit Margin of Safety Is Appropriate

The Draft TMDL depends on a very complex framework of water quality standards, assessment methodologies, and models to derive allocations; each with its own environmental conservatism. This combined framework results in a sum level of conservatism reflecting all of the contributing sources of conservatism.

For example, the water quality criteria themselves are conservative, as stated in the original criteria document (EPA CBPO, 2003): "…these criteria were developed with conservative (protective) assumptions, allowing a small percentage of circumstances in which the criteria may be exceeded will still fully protect the tidal-water designated uses."

The assessment methodology includes several conservative elements, such as the fact that any exceedance of the cumulative frequency distribution ("CFD") reference curve is considered a potential violation, even if the segment being assessed has a lower total violation rate in time-space (*i.e.*, area under the CFD curve) than the reference condition. The use of the default 10-percent reference curve for some criteria is also conservative in that Bay sites that are believed to be complying with standards are being found not to be in compliance based on conservative assumptions of the TMDL. The fact that the TMDL is developed for a critical 3-year condition, instead of average conditions, provides another layer of conservatism.

Furthermore, although the model is not designed to be explicitly conservative, a review of the UMD/MAWP Year 1 and Year 2 BMP efficiency reports revealed many examples of where conservatively low BMP efficiencies were selected for use with the Phase 5 watershed model. For example:

BMP	Conservative Assumption from Year 1 & 2 BMP Efficiency Reports
Riparian buffers	"…a 20% reduction in the effectiveness values is applied to efficiencies from literature sources…"
Urban wet ponds and wetlands	"The uncertainty in how improper maintenance will adjust BMP efficiencies supports the recommendation to use a more conservative percent removal estimate."
Dry detention basins	"…effectiveness estimates for Dry Detention Ponds/Basins and Hydrodynamic Structures were not changed based on the recommendation of the USWG. However…the available literature does suggest somewhat higher removal rates…"
Bioretention	"The 10% TN concentration reduction [is] a conservative judgment…"
Vegetated open channel	"A more conservative value from the CWP estimate was selected…"
Permeable pavement	"…a conservative approach is taken to estimating permeable pavement and paver performance."
Infiltration basins	"…a 15% reduction in TN is used here for systems with sand

and trenches	or vegetation, and 0% TN removal for systems without sand and/or vegetation, to be consistent with the other infiltration and filtration BMPs in this report and to be conservative."
Off-stream watering	"…we proposed values close to the conservative literature base…"

The Bay Program Office has identified specific sources of environmental conservatism that are built into the analysis that justify an implicit margin of safety for the TMDL:

- The fact that allocations to achieve D.O. standards are driven by a relatively small area in the Bay (segment CB4), and that most of the rest of the Bay system would achieve DO standards under higher nutrient loading levels.

- The fact that 100% of point sources are assumed in model scenarios to operate at their maximum permissible loading levels, which is highly unlikely to ever occur.

Given the multiple layers of conservatism in the TMDL allocation process, VAMWA supports EPA's decision to use an implicit margin of safety.

D. EPA's Failure to Recognize Essential Equivalency in Its Target Load Options Is Unreasonable

In the determination of basin nutrient loadings (190 TN and 12.7 TP) EPA utilized the 1% rule to determine compliance (with the exception of certain problem segments). Bell (2010b) performed a statistical "power analysis" to evaluate the minimum difference in D.O. that would be statistically detectable in the Chesapeake Bay Monitoring Program.[72] Based on the results of this analysis, segments that are close to attainment would require spatial D.O. violation rates that differ by 4% or more before they would be statistically distinguished from one another. The management implications are that Bay model D.O. scenario results with differences less than 4% should be considered "essentially equivalent." This is not the case in the current TMDL. Based on the above referenced "power analysis," the scenario associated with Target load Option A produces results that are "essentially equivalent" to EPA's recommended basin target loads of 190 mpy/yr TN and 12.7 mpy/yr TP (Bell, 2010a). At this level of nutrient loading the key Bay segments of CB4MH, CB5MH, MD5MH, and VA5MH are predicted to be in attainment or be within 2% of attainment. It is recognized that Target load Option A would not immediately address attainment in some of the side segments. However, effectively addressing these side segments would require separate, locally oriented modeling analysis with tools better adapted to evaluating local conditions. The Target Load Option A to comply with D.O. standards in the main bay is essentially equivalent to the more stringent and costly to attain allocations associated with 190 TN and 12.7 T and the TMDL; this must be recognized in the TMDL.

[72] Attached hereto as Appendix 41.

E. EPA Should Assume Better Design, Installation, Operation and Maintenance for Modeled BMPs

It is well known that historically many non-point BMPs have not been accompanied by programs or methods to ensure proper design, installation, operation, or maintenance. It is reasonable that model calibration scenarios should assume, at a minimum, historical "average" management conditions. Any other approach—including the use of conservatively low values—would make the model less accurate and force management decisions that may be more costly and/or provide less benefit. However, it is not necessary for forward-looking management scenarios to retain the assumption of historically-average BMP management. Rather, improvements in the way BMPs are installed, operated, and maintained are a viable implementation component. Modeled TMDL allocations scenarios should reflect the manner in which BMPs *should* be designed, operated, and maintained, not necessarily how they have historically been managed.

One example of where EPA and the Bay States have assumed a high level of nutrient removal performance is for wastewater treatment plants. The performance expected and used in the model is based on properly installed, operated and maintained facilities. The standard for performance relative to design of any nutrient removal strategy (wastewater plants, BMPs, filter feeders, etc.) used in the Bay model should not be different.[73]

These actions would improve the effectiveness of BMPs to reduce loads and improve reasonable assurance of reductions from these sectors.

VIII. EPA'S BACKSTOPS ELIMINATE PLANNED AGRICULTURAL LOAD REDUCTIONS DESPITE THOSE CONTROLS BEING AMONG THE MOST COST-EFFECTIVE MEASURES FOR IMPROVEMENT

Section 6 of the Draft TMDL document describes EPA's allocation method for relating relative impact to needed controls. The methodology recognizes that nonpoint sources cannot attain the same levels of control as point sources, and calls for 55-75% of E3 nitrogen controls from nonpoint sources such as agriculture. However, EPA's "backstop" allocations appear to have been accompanied by increases in allocations to nonpoint sources, such that agriculture in many basins fall well short of the intended level of nitrogen control. In so doing, EPA has dispensed with the fairness/equity concepts developed by its own TMDL work group, and shifted implementation away from the most cost-effective, environmentally beneficial practices.

Overall, EPA's Draft TMDL appears to put Virginia agriculture at a 48% level of nitrogen control (relative to E3), well below the 55-75% level indicated by the relative-effectiveness allocation methodology and far short of controls called for in both Virginia's Tributary Strategy and Draft WIP (Figure 5). This is partly driven by the lower levels of effort in the Potomac River Basin (51%), but primarily driven by an extraordinarily low (17%) level of effort for the

[73] See VAMWA Chesapeake Bay Team Memo re BMP Efficiencies to VAMWA and MAMWA Boards of Directors, January 21, 2009 (attached hereto as Appendix 42).

James River Basin, which is akin to the 2009 progress levels (Figure 6). VAMWA fails to comprehend how EPA can make deep and costly cuts to point source allocations in the James River Basin while concluding that agriculture requires no further improvements in this basin.

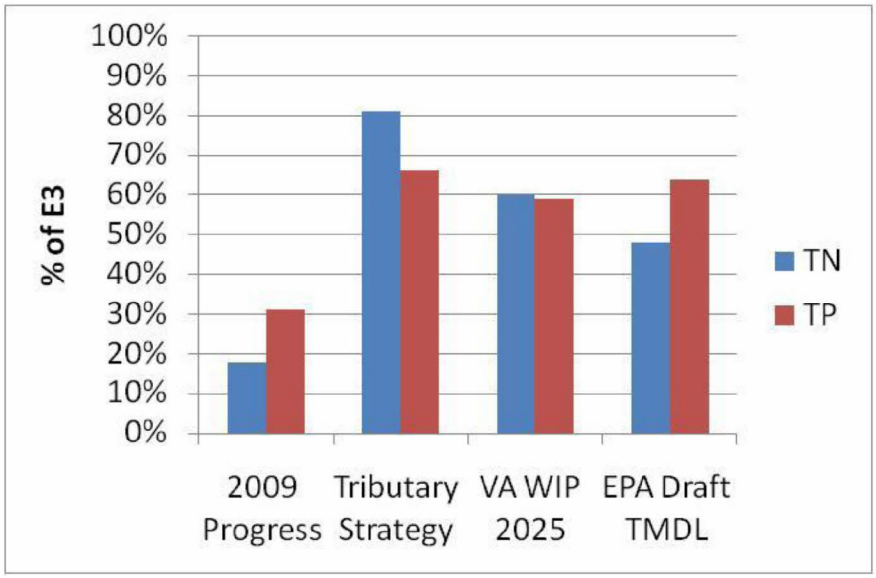

Figure 5: Comparison of agricultural controls among model scenarios

Agricultural management practices include most of the practices that the EPA and others (e.g., Chesapeake Bay Commission, 2004) have identified as the most-cost effective, including nutrient management, conservation tillage, cover crops, and riparian buffers. Relative to many urban and wastewater-based practices, these practices provide much high levels of ancillary environmental benefits such as wildlife habitat, stream habitat protection, flood control, and greenhouse gas reduction. To illustrate these points, Appendix 43 presents a case study of alternative nutrient controls for the York River basin using the *BMP Benefit Planner* ver. 1.1.[74] The case study demonstrates that the DO-based overall loading goal can be achieved in a much more cost-effective, environmentally beneficial manner by a different combination of point and nonpoint source controls than reflected in the draft TMDL allocations.

[74] Malcolm Pirnie, Inc., working on behalf of VAMWA, has developed a spreadsheet based model to compare implementation scenarios with regard to environmental sustainability and cost effectiveness. More specifically, the *BMP Benefit Planner* ver. 1.1 considers energy usage, indirect and direct GHG emissions, carbon sequestration, costs (*i.e.*, capital, operations and maintenance, annualized), and other ancillary benefits (*i.e.*, wildlife habitat, instream habitat, aesthetics, public health, flood hazard mitigation, and groundwater re-charge and base-flow protection). The model addresses a number of common management practices involving wastewater upgrades and various agricultural and urban practices.

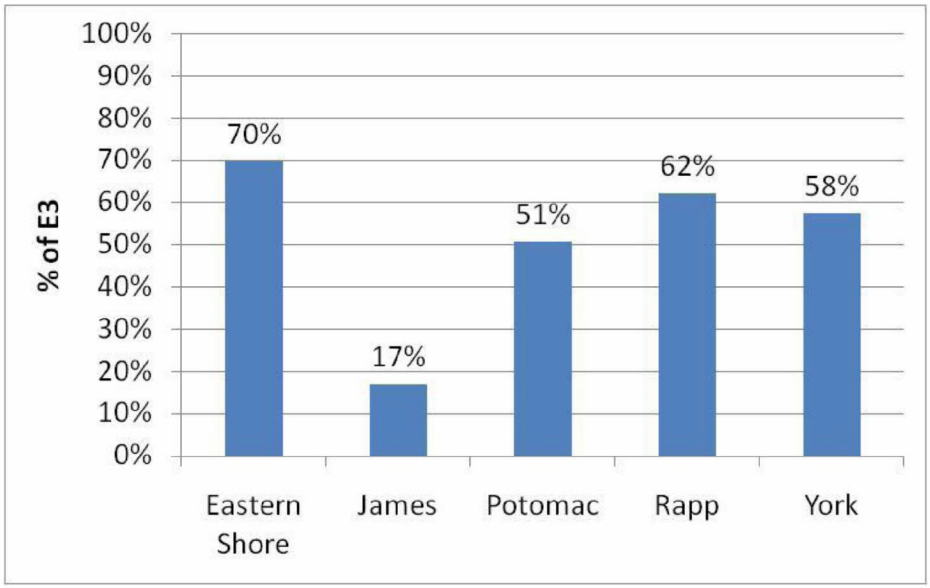

Figure 6: Comparison of agricultural nitrogen controls among basins for EPA's proposed TMDL scenario

VAMWA expects EPA to allocate point and nonpoint sources in an equitable manner that requires a high level of effort from both sectors. In particular, EPA must remedy the low level of agricultural controls proposed for the James River basin, consistent with the widespread understanding that the agricultural sector has abundant opportunities for improvement and cost-effective load reductions.

IX. THE TMDL SEDIMENT ALLOCATIONS ARE UNREASONABLE

The "backstop" point source WLAs for TSS were based on a very low technology-based value (4-5 mg/L), which appear to have been derived from the State of Maryland's definition of ENR. The WLAs represent very large, costly reductions in currently-permitted loads for no environmental benefit. Point source dischargers (excluding MS4s) represent a *de minimis* proportion of the total suspended solids to tidal waters—*less than 1%* according to the "2009 progress" run of the Phase 5.3 model output. The TSS in secondary effluent primarily consists of biological floc (Tchobanoglous and others, 2002) which is biodegradable and non-persistent in the environment. There are no other scientific reports or data to support the conclusion that point source-derived TSS is a significant cause of impairments to submerged aquatic vegetation (SAV). Therefore, the proposed reductions have no water quality basis.

If EPA cut TSS loads not because it expected a measureable water quality benefit, but simply based on a presumption that these values would be coincident to nutrient reduction, this is not always true. Point sources can vary widely with regard to the treatment technology employed, and not all nutrient removal methods utilize filters that would achieve 4-5 mg/L effluent TSS.

For example, in biological phosphorus removal, the primary means of removing phosphorus are clarification and biosolids wasting.

On a related point, the TSS WLAs represent a serious barrier to nutrient trading and offsets, and thus a barrier to flexible and cost-effective implementation. For example, some dischargers might choose a nutrient removal technology that does not achieve the extremely low TSS concentrations, and offset a portion of their nutrient loads in some other fashion (e.g., nonpoint source BMPs). The need to install expensive technology anyway (to meet unnecessarily stringent TSS limits) would remove the economic incentives of the offset or trade.

There are many examples of state and EPA-approved TMDLs for sediment that involve permitting point sources at existing TSS levels (secondary treatment or best practicable controls technologies), as proposed in Virginia's Draft WIP. Such an approach would be fully protective of the Chesapeake Bay system while providing the option of flexibility and cost-effectiveness in implementation. EPA should allocate point source TSS WLAs at existing permitted levels.

X. EPA's VIEW OF RELATIVE EFFECTIVENESS IS INCORRECT

The James and York Rivers have an insignificant effect on Chesapeake Bay DO. Furthermore, Rappahannock loads are small in relation to other rivers.

A. The James & York River Basins Have No Meaningful Impact on Water Quality in the Mainstem Bay

In the 2003 allocation effort, allocations for the James and York River basins were established at "Tributary Strategy" loadings. This decision reflected recognition that the nutrient loadings for these basins did not significantly influence the mainstem D.O. conditions at segment CB4 and, further, that additional nutrient controls (point and non-point) were warranted for local water quality needs only. [75] This was a fundamental assumption of the 2005 Virginia Tributary Strategies. In 2009, the impact of nutrient reductions on improving mid-Bay D.O. were re-evaluated for the basins with a different approach taken to assess the "relative effectiveness" as follows:

- River basins were sub-divided further into Above-Fall-Line ("AFL") and Below-Fall-Line ("BFL") segments (previously only major tributaries were considered).

- Estuarine effectiveness[76] considered CB3-CB5 Deep Water (DW) plus Potomac Mesohaline DW and Deep Channel (previously the analysis focused on CB4 DW).

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[75] Memorandum from W. Tayloe Murphy, Jr., Chair, PSC to PSC Members and Headwaters Representatives (attached hereto as Appendix 44).

[76] Estuarine effectiveness is a measure of the mean change in D.O. at a region of the Bay covering an area of CB3-5 DW plus Potomac MH DW and deep-channel-per million algal units. An algal unit is calculated as (TN+TP*10)/2. It is calculated through modeling by isolating a particular basin in question for reduction to E3 loads while all other

Relative effectiveness scores[77] were calculated by multiplying estuarine effectiveness with the respective delivery factors[78] for each of these basins (previously delivery factors were not addressed in the scores). Draft results under this revised scoring method are shown in Figure 7. A comparison between Figure 8 (2003) and Figure 7 (2009 draft) indicates that the relative order of importance of the basins has changed along the x-axis. For example, the relative importance of the lower James now is greater than the above fall line York and Rappahannock; with the below fall line York greater than the above fall line Patuxent and Potomac.

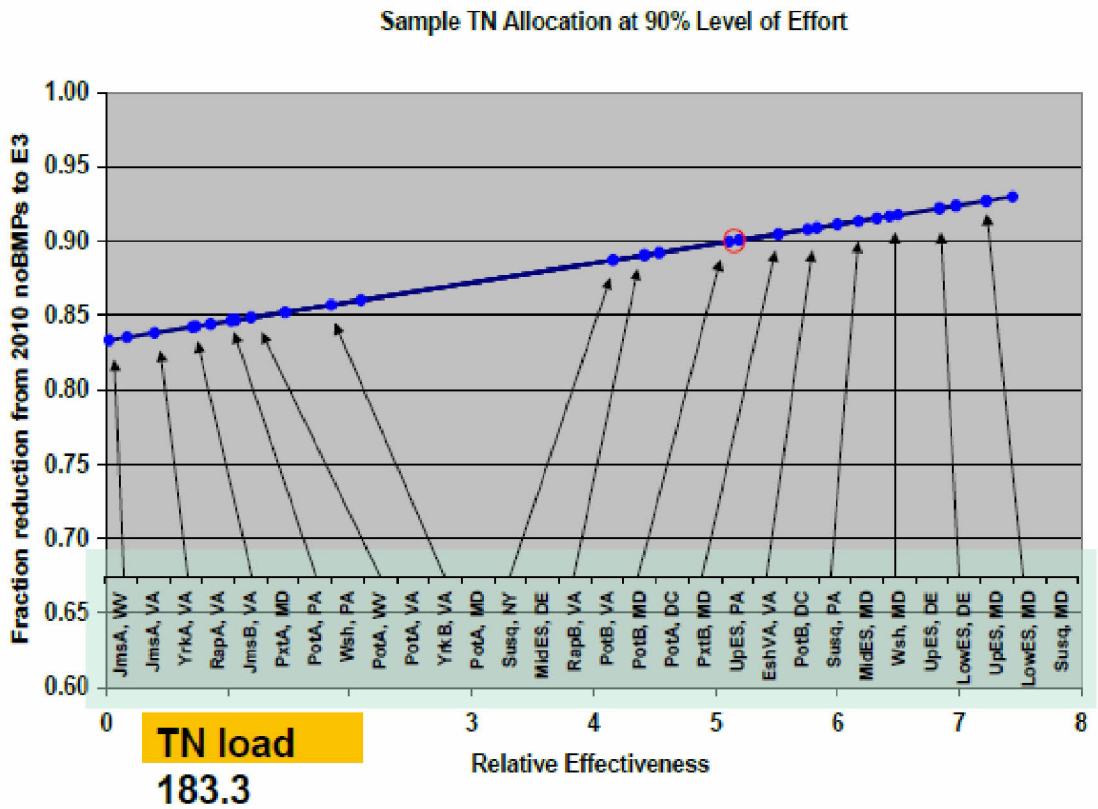

Figure 7: Revised Scoring Method for Relative Effectiveness (x-axis)

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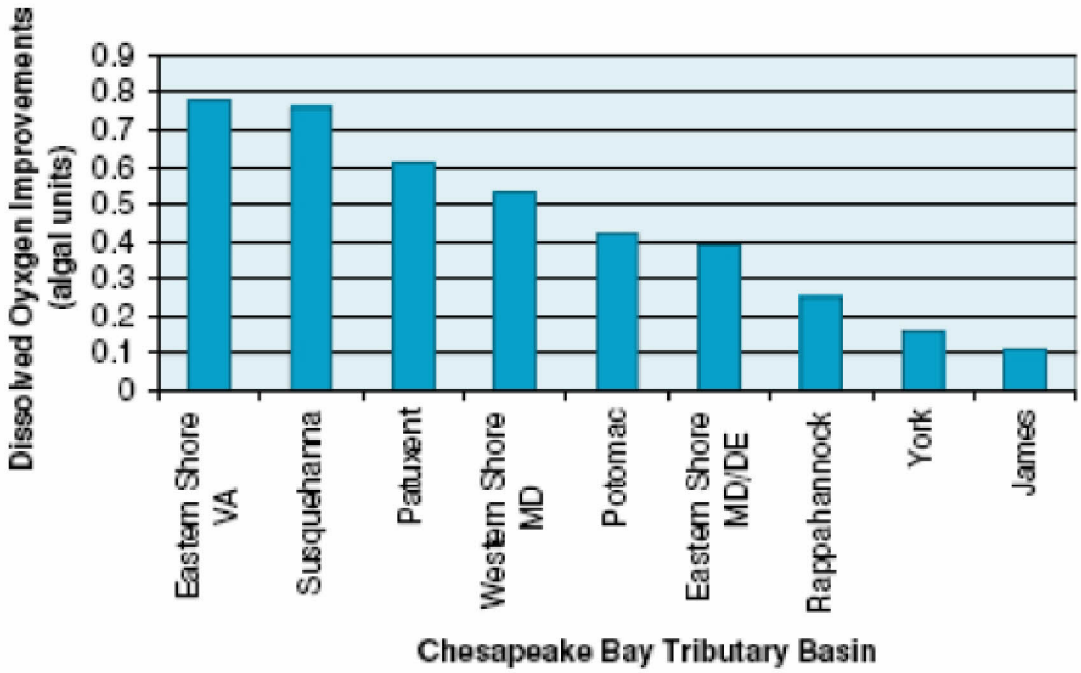
basins are held constant at calibration levels. Once the basin is isolated the incremental change in D.O. at the mid-Bay is measured and recorded. For example, an estuarine effectiveness for the James below the fall line of 1 ug/L indicates that mean D.O. in the mid-Bay (as defined above) would change 0.001 mg/L for each million algal unit reduced.

[77] Relative effectiveness is a factor calculated as estuarine effectiveness times the delivery factor. Relative effectiveness is an attempt to normalize the estuarine effectiveness by the delivery factor of nutrients.

[78] Delivery factor is a ratio of the delivered load to the edge of stream loads to "tidal waters" of the watershed model.



From EPA 2003

Figure 8: Estuarine Effectiveness (2003)

To further address the issues, the geographical scoring data (2009) was requested and received from the CBPO for review and analysis.[79] Key findings are as follows:

First, in terms of "estuarine effectiveness," the relative rankings of the basins remain comparable in 2009 to those determined in 2003. The James and York basins (now considered separately for AFL and BFL) continue to consistently have the ***lowest*** "estuarine effectiveness" of all other basins (Figure 9). Note: The separations between "Low," "Medium," and "High" were based on dividing the response range by three. This is for illustrative purposes to compare the 2003 and draft 2009 approaches.

[79]Attached hereto as Appendix 45.

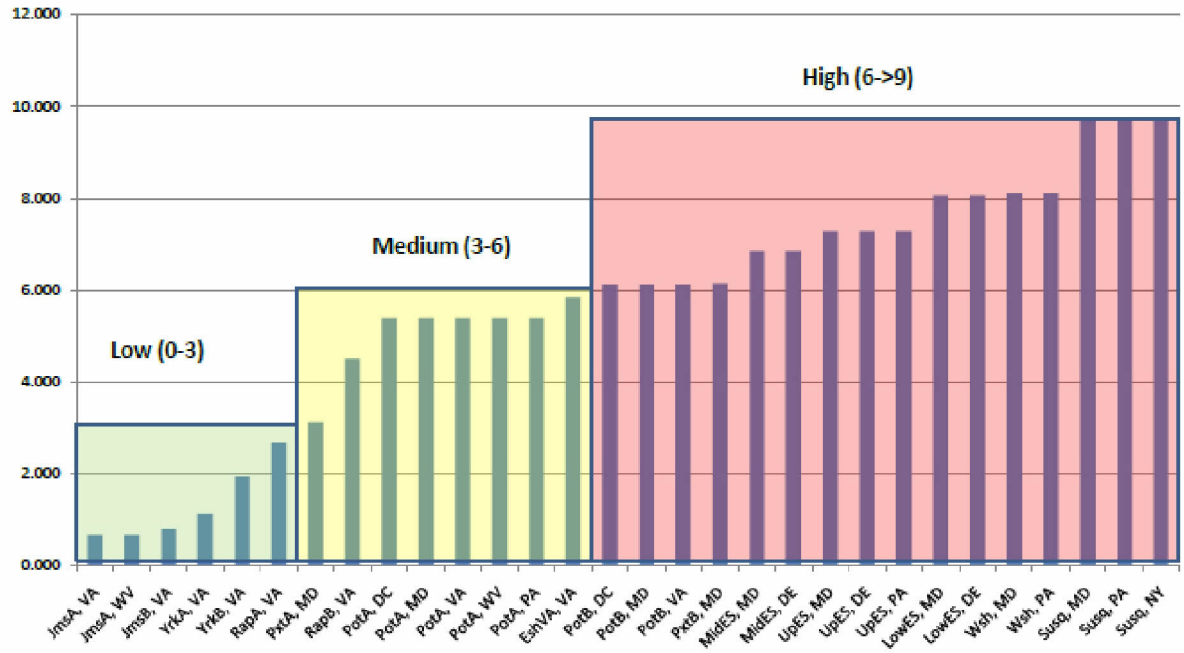


Figure 9: Estuarine Effectiveness- Mean DO (ug/l) per million algal units
CB3-5 DW + POTMH + DC (NPS+PS Loads)

Second, the absolute impact of the James and York Rivers on mid-Bay D.O. was estimated by multiplying delivered loads by their respective estuarine effectiveness. The results indicated that at the Working Target Loads (established by EPA in a letter to the Virginia Secretary of Natural Resources, November 3, 2009)[80] the combined impact of the James and York Rivers on mean mid-Bay D.O. was 0.033 mg/L. Further, reducing 2005 Tributary Strategy Loads to "E3" levels indicated an incremental improvement of only 0.007 mg/L D.O. This near zero incremental D.O. improvement potential at the mid-Bay associated with additional James and York controls is negligible because it is well within the error of analytical D.O. measurement and/or reliability of model predictions. These findings confirm that the James and York Rivers have an insignificant effect on main Bay D.O. conditions and therefore further reductions are not necessary.

[80] Attached hereto as Appendix 46.

Estimate of York and James loads on mid Bay DO conditions based on estuarine effectiveness

	TS			DO impact	E3			DO impact	
Basin	TN	TP	AUs	(mg/l)	TN	TP	AUs	(mg/l)	
York	7.2	0.69	7.05	0.011	4.4	0.4	4.2	0.006	
James	28.1	3.6	32.05	0.023	16.8	3.75	27.15	0.020	
Sum				0.034				0.026	
								0.008	Incremental change from TS to E3

Estuarine effectiveness measures mean DO (mg/l) per million algal units - for CB3-5 DW and POTMH DW+DC. Taken from draft CBPO materials (see data sheet)

JamesA	0.000654
JamesB	0.000798
Average	0.000726
YorkA	0.001119
YorkB	0.001926
Average	0.001523

Algal units were calculated according to 4-07-2009 MdSc presentation materials where AU=(TN+10*TP)/2, units are millions.

Third, it is recognized that the new revised scoring methods have created confusion about the management of the York and James. However, the low relative effectiveness of small, isolated headwater basins elsewhere in the Bay watershed do not cancel the established scientific basis for regulating the James and York basins based on local water quality conditions rather than on mid-Bay D.O. With regard to the relative effectiveness plots identifying that selected other basin-jurisdictions also have low relative effectiveness (plotting on the left side of the relative effectiveness charts in Figure 7), most of these other segments are small, headwater basins that are not representative of the larger, high-estuarine-effectiveness basins to which they drain. Their plotting position is largely driven by state-line truncations that isolate headwaters far from tidal waters (*e.g.*, Potomac above fall line (PotA) for West Virginia, PotA for Pennsylvania (PA), and the western shore of PA), or by other unusual characteristics of these small headwater basins (*e.g.*, high reservoir density in the Maryland portion of the Patuxent above the fall line. Obviously, it is possible to subdivide larger basins in any number of ways to isolate small headwaters with low relative effectiveness. However, such subdivisions are not a legitimate basis for making decisions about whether basins as a whole are to be included or excluded in allocations based on mid-Bay D.O. considerations. Such an approach would create an awkward patchwork, with high-effectiveness estuaries such as those identified in this paragraph mostly included in the TMDL but missing small, non-representative headwater segments. In contrast, the established decision to exclude the James and York basins from mid-Bay based allocation principles is based on the fact that the James and York basins as a whole have negligible impact on mid-Bay D.O. This logic remains in effect and the existing scientific and policy decisions must be maintained.

Given the minimal effects of the James and York on the mainstem Chesapeake Bay D.O conditions the TMDLs for these rivers are a Virginia responsibility rather than EPA's responsibility.

B. EPA Should Adequately Document the Small Influence of the Rappahannock River

The TMDL does not adequately document the small influence of the Rappahannock River on the Chesapeake Bay. Figure 10 indicates the percentage of inflow attributable to the major river basins of the Bay from 1978-2009. The Rappahannock River accounts for only 2.7% of total inflow to the Bay. Although this river has a moderate estuarine effect on D.O. on the mainstem Bay on a per pound basis (Figure 10) its actual effect on mainstem Bay D.O. is quite small because of its relatively low inflows and loads.

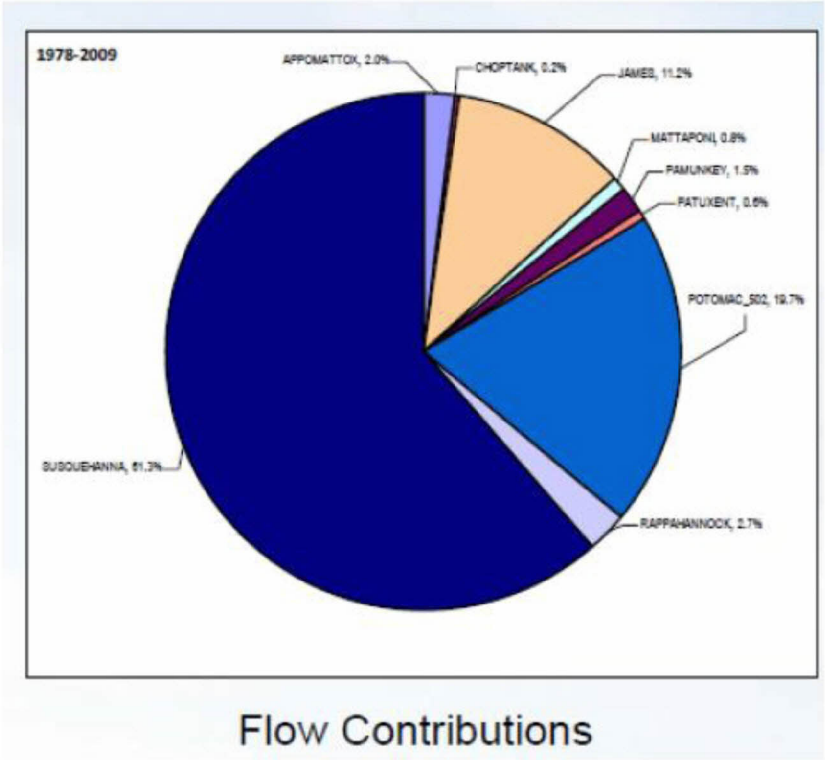


Figure taken from Water Quality Steering Committee conference call materials (09-09-09)

Figure 10

XI. EPA HAS INAPPROPRIATELY FAILED TO CONSIDER COST, COST-EFFECTIVENESS, AND COST BENEFIT

In order to withstand appellate scrutiny by a Federal Court, EPA must be able to meet the "arbitrary and capricious" standard of review for a federal agency action mandated by the Administrative Procedure Act.[81] Specifically, a Federal Court will "….hold unlawful and set

[81] 5 U.S.C.§500, *et seq.*

aside agency action, findings, and conclusions found to be arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law…"[82] The U.S. Court of Appeals for the D.C. Circuit explained that an action will be held arbitrary and capricious:

> …if the agency has relied on factors which Congress has not intended it to consider, **entirely failed to consider an important aspect of the problem**, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise… [83]

EPA's failure to consider cost, cost-effectiveness, or cost-benefit in its Draft TMDL is the epitome of agency decisionmaking that fails "to consider an important aspect of the problem."[84]

EPA's Draft TMDL allocates reductions among various source sectors. VAMWA believes that considerations of cost, cost-effectiveness and cost-benefit are imperative parts of determining how to make these allocations. It is hard to imagine how EPA could have made a reasoned decision on this issue without considering cost, cost-effectiveness, and cost-benefit. EPA certainly should not have, given the scope of the Bay TMDL. In addition, a consideration of cost issues, in particular a careful review of which options are the most cost-effective, would benefit EPA, by providing more reasonable assurance for this TMDL. Cost-effective measures are much more likely to actually be implemented, and implemented on schedule, as compared to measures that are extraordinarily expensive. EPA's refusal to consider cost contradicts its own demands for reasonable assurance.

For example, EPA has made the determination in this Draft TMDL to shift allocations from Virginia's wastewater sector to the agriculture sector. Yet, it would appear that EPA's decision is not based in any way on cost issues. The record for this TMDL contains no information on the wisdom of mandating additional, costly reductions in wastewater in lieu of requiring additional BMPs by agricultural sources which are typically far more cost-effective.[85] This is unacceptable, particularly in light of the fact that there is insufficient federal funding for the clean-up and local resources are strained in a way that they have not been for many decades.[86]

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[82] 5 U.S.C. § 706(2)(A).

[83] Eagle Broadcasting Group, Ltd. v. F.C.C., 563 F.3d 543, 551 (D.C. Cir. 2009) (emphasis added).

[84] EPA materials from April, 2009, show a willingness on EPA's part to consider affordability as a part of this process. See April 20-21, 2009 Presentation from B. Koroncai to PSC (Chesapeake Bay Water Quality Big Picture) at slide 13 ("An affordability assessment will be completed") (attached hereto as Appendix 31). Yet, EPA's Draft TMDL leaves the question of affordability entirely unaddressed.

[85] See attached Cost-Effective Strategies for the Bay (Chesapeake Bay Commission, December 2004) (attached hereto as Appendix 47).

[86] In November, 2009, the Governors of Virginia and Maryland wrote to the President asking that he consider the need for federal assistance for Bay clean-up efforts (attached as Appendix 48). Note that the letter was written in response to the Executive Order strategy and reports. VAMWA submits that the financial need is even more dire

Although economics at the state level have improved slightly over the last year, local governments continue to suffer with tightening local budgets and reduced revenues. According to an October, 2010 Research Brief from the National League of Cities ("NLC"), "Local and regional economies characterized by struggling housing markets, slow consumer spending, and high levels of unemployment are driving declines in city revenues." The October brief shows that concerns over local fiscal health remain at the highest level in the 25 year history of the survey. Two of the major issues plaguing cities are declines in personal property and sales tax. As a result, NLC concludes that:

> 2010 reflects a number of downward trends for city fiscal conditions. The impacts of the economic downturn are becoming increasingly evident in city projections for final 2010 revenues and expenditures, and in the actions taken in response to changing conditions. The local sector of the economy is now fully [sic] the midst of a downturn that will be several years in length. The effects of a depressed real estate market, low levels of consumer confidence, and high levels of unemployment will likely play out in cities through 2010, 2011, and beyond.[87]

The National Association of Counties also conducted a survey of a sample counties across the United States in June, 2010 ("How are Counties Doing? An Economic Status Survey"). According to the Executive Summary: "This survey reveals that the downturn continues to be widespread with counties of all sizes feeling the crunch from many directions." Furthermore, "[c]ounties report that they are using furloughs, layoffs and service curtailment to help reduce budgets that in many cases remain problematic because of continuing shortfalls."[88]

A. Case Study Demonstration: James River Basin

The James River basin alone faces extraordinary costs if EPA's allocations are finalized. As the knee-of-the-curve below shows, it would cost over **$10 billion more** on the James to comply with EPA's Draft TMDL allocations for chlorophyll-*a*.

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now given the requirements of the Draft TMDL. See also June 15, 2010 Letter from Virginia Governor Robert E. McDonnell to Lisa P. Jackson, EPA Administrator (attached hereto as Appendix 19).

[87] October Research Brief at 7 (available online at http://www.nlc.org/ASSETS/AE26793318A645C795C9CD11DAB3B39B/RB_CityFiscalConditions2010.pdf).

[88] Survey results available online at: http://www.naco.org/research/pubs/Documents/Surveys/Research%20Surveys/How%20are%20Counties%20Doing%20An%20Economic%20Status%20Survey%20July%202010.pdf

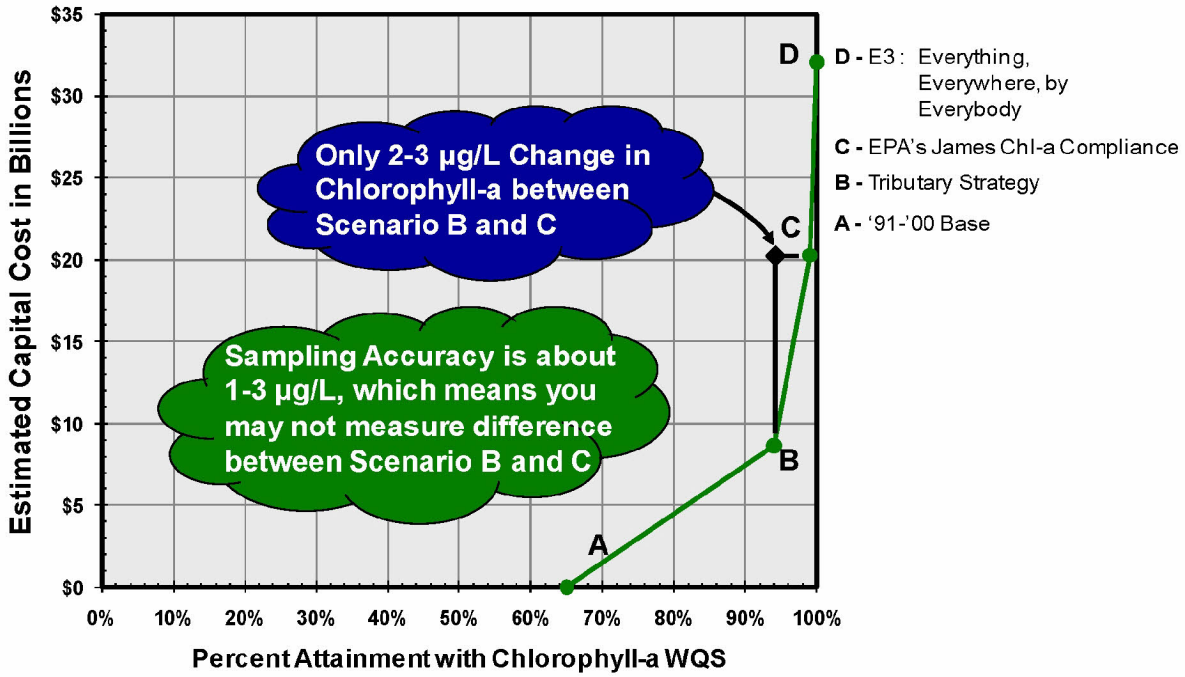

Figure 11: Knee-of-the-Curve Analysis for James River Chlorophyll-a WQS

Figure 11 shows that the cost of the Tributary Strategy is approximately $9 Billion. In addition, the Figure shows the estimated capital costs of attaining the chlorophyll-a criteria against the percent attainment rate. The capital costs include estimates for basin-wide wastewater treatment plant upgrades, agricultural BMPs, and urban runoff controls necessary to meet the allocations identified by EPA for the scenarios identified in Figure 11. The wastewater treatment plant capital costs are a function of design flows and level of treatment (biological nutrient removal, enhanced nutrient removal and limit of technology). Agricultural capital costs are based on BMP unit cost per acre and the BMP assumptions used in the Phase 5.3 Model. The urban runoff capital costs[89] are based on the performance associated with the runoff reduction method for an estimated amount of retrofit controls that could be installed in a locality, which represents only a portion of the urban runoff costs. The costs for the remainder of the urban runoff reductions needed to meet the allocations would be achieved with stormwater capture/storage and reuse. The estimated capital costs were prepared for the following EPA Scenarios:

- '91-'00 Base Scenario: Point "A" represents the James River TN and TP loading of 36.9 and 3.3 million pounds per year, respectively.

- EPA's Tributary Strategy: Point "B" represents the James River TN and TP portion of the Bay-wide loading, which is 27.5 and 3.3 million pounds per year, respectively.

[89] Urban nutrient management was not included. The capital costs are based on meeting the waste load allocation for the Urban Runoff identified in Appendix Q-1 of the Draft TMDL.

- EPA's James Chl-a Compliance: Point "C" represents the James River TN and TP loading of 23.5 and 2.35 million pounds per year, respectively. EPA has selected this scenario as the basis for compliance with the James River chlorophyll-a criteria. EPA also refers to this scenario as "James Level of Effort at ½ Potomac". In the Draft TMDL (Appendix J), EPA states "In the James, the nutrient loads are equivalent to the level of effort half way between Virginia's portion of the Potomac and the James for the 190/12 Loading Scenario." In other words, EPA is referring to a new theoretical scenario that is more stringent than the Virginia Regulations as to the James River but not quite as stringent as Virginia's Regulations require for the Potomac River, which have a far greater impact on Bay water quality.

- E3 (Everything, Everywhere, by Everybody): Point "D" represents the James River TN and TP loading of 16.1 and 1.5 million pounds per year, respectively. EPA considers this to be the "theoretical maximum levels of managed controls on all pollutant load sources". There are no cost and few physical limitations to implementing controls for point and nonpoint sources that are recognized in the E3 scenario. This scenario is used with the No-Action scenario to define the "controllable" loads, i.e., the difference between No-Action and E3 loads." See Draft TMDL at Appendix J.

The knee-of-the-curve analysis determines where the increment of pollution reduction achieved in the receiving water diminishes compared to the increased costs. There is a **steep inflection** at Point "B" that represents the knee-of-the-curve. Any reduction beyond Point "B" lacks a viable cost-to-benefit ratio and does not reflect a reasonable benefit. EPA has selected Point "C" as the basis for the James River compliance with the chlorophyll-a criteria, which is about half way between Point "B" and EPA's E3 scenario (Point "D"). If one assumes that the model predictions are accurate (about which there is substantial doubt), at Point "B", the James River would be 93 to 94 percent compliant with chlorophyll-a criteria compared to 99 percent at Point "C." However, the true difference in chlorophyll model output between Points "B" and "C" is only 2 to 3 μg/L (three parts in a billion). Additionally, the sampling and testing accuracies for physical water measurements is 1 to 3 μg/L. In other words, even if the loadings between Points "B" and "C" were achieved, it is unlikely that the difference in James River chlorophyll-*a* concentrations could be measured. The difference in the estimated cost of achieving the loadings between Points "B" and "C," on the other hand, is over $10 billion- a sum that cannot only be measured, but will be paid by Virginians, if EPA's Draft TMDL is adopted as is on this issue.

In summary, it is incumbent upon EPA to reconsider the basis for the James River allocations considering the magnitude of the costs of attaining levels of load reductions required to produce a difference in modeled chlorophyll-a concentrations so small that they cannot be reliably measured. Further, it is incumbent upon EPA to consider these staggering costs as it finalizes its TMDL. At a minimum, EPA should not pass the knee-of-the-curve identified at Point "B" of the above graph. Assuming there is any real water quality improvement beyond Point "B," it would not be cost effective, could not be physically measured, and could not be reasonably attained. The only reasonable response is to set James River basin allocations based on the Tributary Strategy allocations.

Given this economic backdrop and weaknesses in the model's predictive abilities at such a small scale,[90] VAMWA cannot begin to understand EPA's decision to sidestep discussing the potential economic impact of the Bay TMDL on Bay dischargers. Furthermore, as noted above, EPA has said that it will not consider requests for a UAA to determine the feasibility of this TMDL. EPA's determination that it will take a lawful option off the table to consider cost-related issues and impacts is indefensible.

B. Case Study Demonstration: York River Basin

Agricultural management practices include most of the practices that EPA and others (e.g., Chesapeake Bay Commission, 2004) have identified as the most-cost effective, including nutrient management, conservation tillage, cover crops, and riparian buffers. Compared to many urban and wastewater-based practices, these practices provide much higher levels of ancillary environmental benefits such as wildlife habitat, stream habitat protection, flood control, and greenhouse gas reduction (VAMWA, 2010). To illustrate these points, Appendix 43 presents a case study of alternative nutrient controls for the York River basin using the Virginia Tech peer reviewed *BMP Benefit Planner* ver. 1.1 (Malcolm Pirnie, 2010). For the case study the above referenced model was used to compare EPA's recommendations for the York River basin with an alternative scenario that would achieve a similar level of nutrient reduction. The alternative scenario consisted of returning municipal point sources to existing requirements (TN= 6 mg/L, TP=0.7 mg/L @ design flows), reducing urban storm water BMP acreage by 50% and increasing agricultural BMPs by 20%. The results indicated that the following:

- Reduced capital costs by approximately 50% (~$1B)
- Reduced operation and maintenance (O+M) costs by 50% ($32M/yr)
- Increased carbon sequestration by approximately 20%
- Significantly reduced green house gas (GHG) emissions
- Increased ancillary benefits associated with wildlife habitat, flood hazard protection, and base-flow projection

This case study is significant because it demonstrates that greater environmental benefit can be achieved at significantly lower cost if flexibility is allowed in the TMDL. EPA's decision to choose a higher-cost alternative and disregard a lower-cost alternative without any justification is arbitrary and capricious.

This case study approach is consistent with the intent of EPA's Healthy Watersheds Initiative. This initiative advocates for a holistic approach to management that includes geomorphology, landscape condition, hydrology, habitat, and biological integrity (http://water.epa.gov/learn/training/wacademy/upload/2010_10_13_slides.pdf).

[90] See earlier discussion regarding modeling issues at Section VII.

EPA has contradicted its own concepts with the Bay TMDL by a narrowing its focus to only nutrient loadings at the exclusion of other end-points important to healthy watersheds.

The monitoring data also indicates that a focus on non-point sources will offer greater potential for Bay improvement. The results of Williams and others (2010) indicate that the drought period of 1999 to 2002 coincided with improving bay-wide trends in most of the metrics that were analyzed. These results demonstrate that non-point source nutrient loads are the key drivers of Chesapeake Bay water quality rather than point sources. As such the TMDL must include more emphasis (not less, as suggested by the draft TMDL) on controlling non-point sources of pollution.

XII. EPA'S CHOICE OF DAILY LOADS THAT ARE TOO LOW IS UNREASONABLE

EPA has not appropriately addressed daily loads in the Bay TMDL. Existing Chesapeake Bay programs were built on the concept of annual load goals. A correct approach on this point is critical for cost-effectiveness and attainability.

It is well established that daily nutrient load variations are environmentally insignificant to the Bay. Furthermore, EPA determined in a 2004 Memorandum,[91] and cited by EPA at Draft TDML, 4-9) that *annual* limits are appropriate in CWA permitting. EPA has stated that:

- The exposure period of concern for nutrient loadings to the Bay and its tidal tributaries is very long;
- The area of concern is far-afield (as opposed to the immediate vicinity of the discharge); and
- The average pollutant load rather than the maximum pollutant load is of concern.

Based on modeling, EPA concluded that "Chesapeake Bay and its tidal tributaries in effect integrate variable point source monthly loads over time, so that as long as a particular annual total load of nitrogen and phosphorous is met, constant or variable intraannual load variation from individual point sources has no effect on water quality in the main bay."[92] According to EPA, "[e]ven a simply steady-state model for permit development such as dividing the annual limit by 12 and establishing that value as the monthly limit is therefore not appropriate."[93]

EPA has repeated its 2004 message in the Draft TMDL:

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[91] Attached hereto as Appendix 49.

[92] 2004 Memorandum at 3.

[93] Id. at 5.

> Numerous Chesapeake studies show that annually based wastewater treatment nutrient reductions are sufficient to protect Chesapeake Bay water quality (Linker 2003, 2005). The seasonal aspects of the jurisdictions' Chesapeake Bay WQS are due to the presence of the living resources being protected, but annual nutrient and sediment load reductions are most important to achieve and maintain the seasonal water quality criteria, some of which span multiple seasons—open-water, shallow-water bay grass, migratory spawning and nursery… [94]

VAMWA agrees that the proper technical basis for the TMDL and WLAs is annual in this case. In our December 2009 Comments,[95] VAMWA made the following recommendations about how to reflect a temporal period in the Bay TMDL:

1. **Select a Large Geographic Scale-** The scale of any "daily" load component of a TMDL should be Bay watershed scale, rather than at any smaller scale such as a Tributary scale.

2. **Set the Daily Load Conservatively High-** Any "daily" load component should include a large percentage of the annual load, such that the daily load would never be a limiting factor for TMDL compliance, even under short-term extreme hydrological conditions.

3. **Document the Key Assumptions About Daily and Annual Loads-** 40 CFR 122.44(d)(1)(vii)(B) requires that: "[e]ffluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7." Therefore, for completeness and clarity for future permitting, the TMDL should document the following WLA assumptions consistent with the 2004 Memorandum: (A) daily WLAs are essentially meaningless in this context and will not be used for permitting purposes, and (B) permit limits for POTWs and industrial discharges will be annual limits to meet annual waste loads. The 2004 Memorandum should be referenced in and incorporated into the TMDL.

In its Draft TMDL, EPA established maximum daily loads for each of the 92 impaired segments in the TMDL, and provided an explanation for how the reader could calculate the seasonal maximum daily load "for any segment, WLA, or LA of interest."[96] EPA also provided annual WLAs and LAs in Draft Appendix Q.

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[94] Draft TMDL at 6-6.

[95] See also December 22, 2008 Memorandum ("Daily" Loads Element of Chesapeake Bay TMDL) from VAMWA/MAMWA Chesapeake Bay Team to CBP Water Quality Steering Committee (attached hereto as Appendix 49).

[96] Draft TMDL at 6-18.

VAMWA objects to EPA's decision to set daily loads at an impaired segment level (rather than the Bay level only), and to establish daily loads based upon the 95% percentile of daily loads.[97] This means that, even if the TMDL were fully achieved, and the modeling has perfectly captured flows, the daily maximum load would be "violated" 5% of the time, or approximately one day out of every twenty.

This methodology would not be as critical if EPA had clearly stated that it would not be using daily WLAs for permitting or compliance purposes for regulated sources. Although VAMWA appreciates EPA's reference to the 2004 Memorandum, and the language quoted above from Draft TMDL at 6-6, EPA has not clearly addressed the inapplicability of daily loads to POTW dischargers. This is highly problematic, as POTWs throughout Virginia and other Bay States have been designed, and the Nutrient Exchange has been developed, to ensure compliance with annual loads. Considerations of treatment plant design and capital and operating costs, including seasonal variation in performance of BNR technology, support an annual rather than daily approach with respect to the point source components of the TMDL.

For these reasons, EPA should revise its Draft TMDL to clearly state that daily loads will not be the yardstick against which POTW compliance is measured. This should be clear in the body of the TMDL itself (e.g., in Section 6) and in all appendices that reference daily loads.

XIII. EPA SHOULD ACCOMMODATE VIRGINIA'S SUCCESSFUL POINT SOURCE TRADING PROGRAM

In Section 10 of the Draft TMDL, EPA addresses the subject of offsets and trading. As with the subject of POTW WLAs discussed elsewhere in these comments, this topic is another area in which the pace of Virginia's real implementation activities under the Chesapeake 2000 Agreement and related State statutes and regulations has far outpaced EPA's TMDL planning activities as of this draft.

This basic timing issue leads to our main point. Given all that Virginia including VAMWA members have invested in the Virginia trading program, it is imperative that EPA be flexible or and conform its new policies to the pre-existing laws, regulations and policies of Virginia as well as the associated compliance plan and related contracts of the Virginia Nutrient Credit Exchange Association discussed in the Draft WIP at pages 41-42.

At page 10-4 of the Draft TMDL, EPA requested comment on whether its proposed offset provisions for new or increased nutrient or sediment loadings should apply to water quality trades in the Bay jurisdictions generally. VAMWA's would strongly recommend that the answer be "no." It is not so much the case that VAMWA would expect to find any major inconsistencies of environmental importance between (1) EPA's guidance and (2) and Virginia's laws, regulations and policies and the Nutrient Exchange's compliance plan, policies and

[97] Draft TMDL at 6-18.

contracts developed consistent with Virginia law. However, a thorough analysis of that question is in itself a major undertaking that simply cannot be performed with a 45-day comment period.

EPA's Draft TMDL calls for consistency with:

- Six (6) "source documents"
- A set of definitions
- A list of 10 "comment elements" with 38 sub-elements

Virginia's existing program includes:

- A complex statute (Va. Code 62.1-44.19:12 et set.)
- The Virginia Regulations (discussed elsewhere in these comments)
- The Chesapeake Bay Watershed General Permit (9VAC25-820) (see Draft WIP at page 41)
- The DEQ-approved Exchange Compliance Plan (2007, 2008, 2009 and 2010 Annual Updates)
- The Nutrient Exchange's 72-party Nutrient Credit Services Agreement

Consider:

- The Watershed General Permit itself contains 30 definitions and 17 pages requirements
- The Nutrient Exchange's 72-party Nutrient Credit Services Agreement is 30-page document with 39 definitions
- The Exchange Compliance Plan consists of hundreds of pages of associated facility plans and trades

This Virginia point-point trading program is working remarkably well and has been widely praised as a national model, including receiving credit in some of EPA's own publications. Therefore, at this time, VAMWA's urges EPA to limit its consideration of new credit-related policies to the specific issue of offsetting new or increased loads.

As to the specific proposals advanced by EPA, VAMWA offers the following comments:

NPDES Permit Noncompliance (Page S-4, Item 6 (b)) – This item is irrelevant to trading and certainly stands to disrupt trading in practice. For trading to be reliable and useful for the users as well as the regulators, it makes no sense that otherwise valid nutrient credits would be disqualified upon noncompliance of the credit generating facility. Consider just a few examples of potential noncompliance: failure to submit a complete renewal application or a required facility-related manual on time, laboratory testing errors, inadvertent exceedence of unrelated nutrient limits, etc. This provision will only inject unnecessary uncertainty into the trading or offsetting process, does not "safeguard" nutrient trades, and actually would work against EPA's stated objectives. This element should be eliminated.

"Disproportionate Harm" (Page S-4, Item 6 (c))– This provision is redundant of the many provisions in Appendix S that state that trading or offsetting must be consistent with water quality standards, which apply to human health and aquatic life. This provision is redundant of the standards that preclude harm by their own terms and, therefore, the provision should be deleted.

"Temporal Consistency" (Page S-4, Item 6 (d))– This provision should be clarified to provide that temporal consistency is satisfied for point sources when the credit is generated and used within the same 12 month period. This request is consistent with the annual basis for the TMDL and WLAs.

"Accountability" Provisions (Page S-5, Item 8) – Much of this section is redundant of the previous seven items in Appendix S. However, a number of the items are worded slightly differently than those prior items. This may lead to confusion and further complicate implementation. We suggest deleting all sub-elements that are addressed elsewhere in the document.

"Net Improvement Offsets" (Page 10-2) – This item is objectionable in that it requires a source to do more than fully offset its own load. This essentially would penalize one party that is achieving zero-discharge for its new or increased activity, by requiring that party to also cleanup for another source that should do so but has not. This violates the most basic notions of fairness and due process, reflects poorly on government, and should be deleted.

XIV. OTHER ISSUES

A. EPA's Failure to Explicitly Include Filter Feeders and Alternative Technologies in the Bay TMDL is Unreasonable

In its December 2009 Comments, VAMWA made recommendations regarding how EPA should include filter feeders in the Bay TMDL. VAMWA explained that various studies and the Bay Program's own modeling efforts have demonstrated that increase biomass of oysters and menhaden have the potential to cause measureable improvements in dissolved oxygen, water clarity, and chlorophyll-*a*. Improvements in these living resources are among the Bay partner's most important goals, and their water quality benefits should be fully considered in the TMDL process. VAMWA suggested that EPA either (a) adopt nutrient and sediment loading caps that implicitly consider the benefits of filter feeder improvements; (2) explicitly assign a certain proportion of the required load reduction to filter feeder restoration; or (3) allow filter feeder restoration to result in the availability of nutrient credits to offset other sources.

EPA ignored these recommendations in the Draft TMDL, choosing instead to note that:

> EPA is basing the TMDL on the current assimilative capacity of filter feeders at existing populations built into the calibration of the oyster filter feeding

> submodel…Potential future changes would not be accounted for in the Bay TMDL. If future monitoring data indicate an increase in the filter feeder population, the appropriate jurisdiction's 2-year milestones delivered load reductions can be adjusted accordingly….[98]

EPA's decision is inappropriate. Oyster farming and aquaculture show real promise. In mid-October, 2010, several news outlets reported the formation of the State's first oyster cooperative, Oyster Company of Virginia. A private company formed a cooperative that will allow Virginia's watermen to lease bottomland from Virginia, plant, grow, harvest and sell oysters. Profits will be plowed back to fuel the endeavor. Although this is project is small in scope at this point, it is an important first step, and an excellent example of what Virginians could do to foster aquaculture. These types of efforts should be considered as a part of this TMDL.[99]

In addition, VAMWA reiterates the support we included in our December 2009 Comments with regard to EPA's efforts to consider the role of Atlantic menhaden in relation to management of chlorophyll-*a*. Recent modeling work has shown that their migration into the tributaries and associated consumption of algae has the potential to affect chlorophyll-*a* and associated compliance with the standards. Although menhaden stocks do not appear to dramatically reduce chlorophyll (as long term averages) their incremental effects are considered comparable to nutrient reduction. VAMWA recommends that additional analyses be conducted to evaluate menhaden effects on seasonal peaks and/or worst years in the record. Further, additional modeling enhancements should be made such that the menhaden migration and residence time varies according to a food gradient. A number of papers indicate that menhaden consumption of algae increases in areas with higher chlorophyll-*a*. This is logical since the species would remain longer in an area with greater availability of food. Because the model does not presently capture these foraging effects the available reductions in chlorophyll due to menhaden (especially during bloom conditions) could be under-estimated.

In addition to filter feeders, VAMWA also recommended that some portion of future reductions needed to meet water quality goals should be assigned to technological advancements, such as the Algal Turf Scrubber® ("ATS") and floating wetlands. Although VAMWA acknowledged these alternative technologies may not be ready for full deployment Bay-wide, VAMWA recommended that EPA acknowledge and encourage their possible future use in the Bay TMDL, including assisting with funding, to encourage research and development. Spending money on research that could make a major dent in clean-up efforts is far preferable to spending money to squeeze minimal reductions from POTW loadings.

EPA also ignored these recommendations in the Draft TMDL. EPA has established an extraordinarily aggressive approach in its Draft TMDL, but it has not left any room for the

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[98] Draft TMDL at 10-8.

[99] Note that, according to news reports, the cooperative "…plans to lobby state and federal officials to include their efforts in the "pollution diet" the U.S. Environmental Protection Agency is drafting for the bay." Daily Press, Oct. 13, 2010 (attached hereto as Appendix 50).

natural progression of technology—technology that could greatly assist in making nutrient and sediment reductions in lieu of expensive additional POTW upgrades.

For these reasons, EPA should revise its Draft TMDL to assign some portion of future reductions to filter feeders and alternative technologies.

B. EPA's Failure to More Aggressively Target Air Deposition Is Unreasonable

CBPO has estimated that atmospheric sources account for about one third of the nitrogen that reaches the Bay, and the majority of this load originates from outside the Chesapeake Bay watershed (EPA, 2010). CBPO has developed airshed model scenarios representing various levels of atmospheric load reduction. Given the magnitude of the load derived from atmospheric sources, it is critical that these sources bear a proportional operational and financial responsibility for load reduction, and other sectors not be negatively impacted due to lack of atmospheric load reductions. This may require the CBPO to model and pursue regulatory strategies that are beyond existing or proposed regulations, including atmospheric controls specifically targeted toward water quality protection.

EPA's Draft TMDL document states that "in determining the amount of air controls to be used as a basis for the air allocation, EPA relied on current laws and regulations under the Clean Air Act." While EPA is calling on states to go well beyond existing programs and regulations for other sectors, it is not applying the same standard to the air allocations for which it is responsible. The resulting allocation is only about 12% lower than 1985 levels, and does not reflect key opportunities of the 2020 maximum feasible scenario, additional ammonia reductions from agricultural practices, or new air regulations specifically focused on nutrient reduction. EPA is being complacent in aggressively chasing down additional reductions from this key source sector. EPA has lackadaisically accepted what other programs are planning for air pollution reductions as good enough. In addition, EPA's decision to require Virginians to clean up nutrients that are deposited on our land from states outside the Watershed begs for a better approach to source reductions.

C. EPA Has Ignored Climate Change Impacts in its Bay TMDL

EPA has not mentioned the climate change impacts of its proposal to reduce POTW allocations below the levels found in Virginia's Draft WIP. Instead, EPA has said:

> To support the 2017 assessment requirement, climate change will be examined to explicitly determine the scope, magnitude, and timing of potential effects. An improved understanding of climate change impacts…will enable water managers to better evaluate risk and make informed decisions about meeting supply needs, complying with water quality regulations, and protecting aquatic ecosystems over

> a range of time scales. Future assessments will include the tidal Bay response in DO, chlorophyll *a*, SAV, and water clarity...[100]

This is arbitrary, and contradictory to other public statements EPA has made regarding the importance of climate change considerations in its Bay clean-up considerations. EPA should carefully consider the climate change impacts of its proposal to reduce POTW WLAs before it issues its final TMDL in December 2010. If WLA reductions would exacerbate climate change, as VAMWA anticipates, EPA should adjust the POTW WLAs accordingly as suggested elsewhere in these comments.

D. The Conowingo Dam Needs a Management Plan Now

The Conowingo Dam is unlike any other dam in the Chesapeake Bay Watershed. Like a large quasi-BMP, the Dam removes on average approximately 3.5 million pounds of TP and 2 million tons of silt from the river annually. Without the Dam, this load would go directly into the upper Bay and once filled, the load would enter the Bay directly.

According to USGS estimates, the Dam will reach capacity around 2025, roughly at the same time the Bay States are expected to finish installing management measures to meet TMDL nutrient loadings. Once the Dam reaches capacity, the sediment load will likely be deposited in the Bay with serious consequences to Bay living resources, including benthics and grasses.

VAMWA asserted in its December 2009 Comments that because of its unique qualities, including location on the Susquehanna River (critically important in meeting Bay water quality goals), large size/span, and age (built in 1928), the Dam needs a management plan.

VAMWA also suggested that EPA and other federal agencies participate in the on-going regulatory process to re-license the Conowingo Dam at the Federal Energy Regulatory Commission ("FERC"), and echoed United States Senator Cardin's comment in the relicensing proceeding that "...a comprehensive analysis of the threat posed by these sediments is only a first step. Exelon, in coordination with the Chesapeake Bay Program Partnership, should develop an effective sediment management strategy that will control this pollution threat throughout the term of the licensing agreement at a minimum."

EPA's Draft TMDL does what VAMWA cautioned against—it delays a discussion of this important issue until the future. EPA has stated that the Bay TMDL "incorporates the current sediment-trapping capacity of the Conowingo Dam at 55 percent, with nitrogen and phosphorus trapping at 2 percent and 40 percent, respectively," but that if those capacities change based upon a review of future monitoring EPA would consider adjusting Pennsylvania, New York, and Maryland's two-year milestones.[101]

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[100] Draft TMDL at 10-7.

[101] Draft TMDL at 10-8.

VAMWA has no position on what the appropriate approach might be as the Conowingo Dam ages and loses capacity, but we do believe that this is a discussion EPA, the Bay States, and interested stakeholders should be having now. The looming threat that the Conowingo presents to all of our good efforts to reduce nutrients and sediments downstream is too important an issue to push off for a discussion on another day. EPA has erred in not considering it more carefully as a part of the development of the Draft TMDL.

E. The American Canoe AND Kingman Park Consent Decrees Do Not Address Virginia's Chlorophyll-a

EPA continues to assert in it must complete the Bay TMDL by 2011 (the December, 2010 deadline is a self-imposed acceleration) because of two consent decrees issued in the late 1990/early 2000 timeframe, American Canoe Association, Inc., *et al* v. EPA, Civil Action No. 98-99-A (U.S. D.Ct. ED VA, 1999)[102] and Kingman Park Civic Association, *et al* v. EPA, Case No. 1:98CV00758 (U.S. D.Ct. D.C., 2000). Draft TMDL at 1-14 – 1-16.

VAMWA submits that EPA's obligations to develop a TMDL by May, 2011 do not extend to establishing loadings on the James River for chlorophyll-*a*. As the earlier discussion of the history of the establishment of the standard (see Section VI above) illustrates, the James River chlorophyll-*a* standard was not even adopted until 2005. In contrast, the American Canoe Consent Decree, was signed and filed in Federal Court in 1999 and covers TMDLs on the then-existing 1998/99 303(d) list for Virginia. It is therefore impossible that EPA's obligation from the American Canoe Consent Decree extends to chlorophyll-*a* on the James given that the standard did not even come into existence until six years later. Although EPA has wrapped the James chlorophyll-*a* issue up into this TMDL, it is not obligated to do so, and should not have done so in light of the major concerns expressed by the State and VAMWA regarding the existing standard.

REFERENCES

Bachman, L.J., Lindsey, B., Brakebill, J., and Powars, D.S. 2008 Groundwater Discharge and Base-Flow Nitrate Loads of Nontidal Streams, and Their Relation to a Hydrogeomorphic Classification of the Chesapeake Bay Watershed, Middle Atlantic Coast. U.S Geologial Survey WRIR-98-4059. 77 p.

Chesapeake Bay Commission. 2004. *Cost Effective Strategies for the Bay: Smart Investments for Nutrient and Sediment Reduction*. 13 p.

Keisman, J. 2010a. Non-Attainment Diagnostics Part Deux. Powerpoint presentation to the Water Quality Goal Implementation Team.

Keisman, J. 2010b. Achieving Attainment of the James Chlorophyll Water Quality Standard", Powerpoint presentation to the Water Quality Goal Implementation Team.

Scientific and Technical Advisory Committee. 2006. Modeling in the Chesapeake Bay Program: 2010 and Beyond. STAC Publication 06-001. 42 p.

[102] Attached hereto as Appendix 51.

Scientific and Technical Advisory Committee. 2008a. Review of the Phase V Community Chesapeake Bay Watershed Model. STAC Publication 08-003

Scientific and Technical Advisory Committee. 2008b. Second Review of the Phase V Community Chesapeake Bay Watershed Model. STAC Publication 08-003.

Tchobanoglous, G., Burton, F.L., and Stensel, H.D. 2002. Wastewater Engineering: Treatment and Reuse.

EPA Chesapeake Bay Program. 2003. Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for the Chesapeake Bay and Its Tidal Tributaries: 2007. 219 p. plus appendices.

EPA Region 3. 2010. Draft Chesapeake Bay Total Maximum Daily Load. EPA-R03-OW-2010-0736-0030VAMWA. 2003. Comments of the Virginia Association of Municipal Wastewater Agencies, Inc., and Maryland Association of Municipal Wastewater Agencies, Inc.on Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for Chesapeake Bay and its Tidal Tributaries (Third Draft, December 2, 2002). Comments submitted to EPA Chesapeake Bay Program.

VAMWA. 2010. *Best Management Practice Benefit Planner ver. 1.1: technical Documentation and User's Guide*. 71 p.