Virginia Regulatory Town Hall

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Final Regulation
Agency Background Document

Approving authority name	State Water Control Board
Virginia Administrative Code (VAC) citation	9 VAC 25-260
Regulation title	Water Quality Standards
Action title	Amendments to Special Standards (9 VAC 25-260-310) for Numerical Water Quality Criteria for Chlorophyll *a* in the James River and Dissolved Oxygen in the Mattaponi and Pamunkey Rivers and associated references in the River Basin Tables 9 VAC 25-260-410 and 530
Document preparation date	November 21, 2005

This information is required for executive branch review and the Virginia Registrar of Regulations, pursuant to the Virginia Administrative Process Act (APA), Executive Orders 21 (2002) and 58 (1999), and the *Virginia Register Form, Style, and Procedure Manual.*

Brief summary

Please provide a brief summary (no more than 2 short paragraphs) of the proposed new regulation, proposed amendments to the existing regulation, or the regulation proposed to be repealed. Alert the reader to all substantive matters or changes. If applicable, generally describe the existing regulation. Also, please include a brief description of changes to the regulation from publication of the proposed regulation to the final regulation.

The rulemaking consists of amendments to the site specific water quality standards for numerical water quality criteria for chlorophyll *a* in the James River and dissolved oxygen in the Mattaponi and Pamunkey Rivers. These regulations were adopted with suspension of the effective date and extension of public comment period on June 28, 2005. The purpose of the extension was to review a change made to the criterion for the summer lower tidal fresh James River and the results of an alternative analysis which considered the chlorophyll levels and costs (attainability) of several agreed upon nutrient loading scenarios. These scenarios included the loadings in the Water Quality Management Planning Regulation (9 VAC 25-720) which was also adopted with suspension on June 28.

Changes made from the June proposal in response to public comment and the alternative analysis include the adjustment of the spring criterion for the James mesohaline and polyhaline segments from 10 micrograms per liter (µg/l) to 12 µg/l, the summer criterion for the oligohaline segment from 15 µg/l to 22 µg/l and the summer criterion for the lower tidal fresh region from 25 µg/L to 23 µg/L.

Statement of final agency action

Please provide a statement of the final action taken by the agency including (1) the date the action was taken, (2) the name of the agency taking the action, and (3) the title of the regulation.

At their November 21, 2005 meeting, the State Water Control Board adopted the amendments to the Water Quality Standards 9 VAC 25-260-310, 410 and 530.

Legal basis

Please identify the state and/or federal legal authority to promulgate this proposed regulation, including (1) the most relevant law and/or regulation, including Code of Virginia citation and General Assembly chapter numbers, if applicable, and (2) promulgating entity, i.e., agency, board, or person. Describe the legal authority and the extent to which the authority is mandatory or discretionary.

The most relevant law is § 62.1-44.15(3a) of the Code of Virginia, as amended, which mandates and authorizes the State Water Control Board to establish water quality standards and policies for any State waters consistent with the purpose and general policy of the State Water Control Law, and to modify, amend or cancel any such standards or policies established. The federal Clean Water Act at 303(c) mandates the State Water Control Board to review and, as appropriate, modify and adopt water quality standards. The corresponding federal water quality standards regulation at 40 CFR 131 requires the states to adopt criteria to protect designated uses and describes the minimum requirements for water quality standards. The minimum requirements for water quality standards are use designations, water quality criteria to protect the designated uses and an antidegradation policy. All of the citations mentioned describe mandates for water quality standards.

The Office of the Attorney General has certified that the agency has the statutory authority to promulgate final text of the regulation.

Purpose

Please explain the need for the new or amended regulation. Describe the rationale or justification of the proposed regulatory action. Detail the specific reasons it is essential to protect the health, safety or welfare of citizens. Discuss the goals of the proposal and the problems the proposal is intended to solve.

This rulemaking is needed to define the most accurate living resource and water quality goals for tributary strategy development (Code of Virginia § 2.2-219), Virginia Pollutant Discharge Elimination System permits (Chapter 3.1 of title 62.1 Code of Virginia) and development of total maximum daily loads (TMDL) under Section 303(d) of the Clean Water Act for the James River as the existing criteria do not adequately or accurately protect these waters from the effects of nutrient pollution. The chlorophyll criteria are also needed to meet water quality standards which designate all waters for "balanced" aquatic life populations (9 VAC 25-260-10) and control of substances which "nourish undesirable or nuisance aquatic plant life" (9 VAC 25-260-20). The dissolved oxygen criteria for the Mattaponi and Pamunkey Rivers are needed to reflect seasonal lower dissolved oxygen concentration due to natural oxygen depleting processes present in the extensive surrounding tidal wetlands.

The rationale and justification behind these amendments is to establish proper water quality standards in order to protect water quality and living resources of Virginia's waters for consumption of fish and shellfish, recreational uses and conservation in general. Protection of water quality and living resources for food and recreation are essential to help maintain the health and welfare of the citizens of the Commonwealth.

The Bay partners with the U.S. Environmental Protection Agency (EPA) Chesapeake Bay program have worked together to publish nutrient related criteria specific to the Chesapeake Bay. The goals of the proposal are to use these criteria in calculating load allocations for the James, Mattaponi and Pamunkey Rivers in the Chesapeake Bay Tributary Strategies, setting Virginia Pollutant Discharge Elimination System Permit limits and for evaluating the water quality of these waters as required by the Clean Water Act (305(b) and 303(d)). Waters not meeting standards will require development of a TMDL under section 303(d) of the Clean Water Act. In May 1999, EPA Region III included the James, Mattaponi and Pamunkey Rivers on Virginia's 1998 Clean Water Act section 303(d) impaired waters list. The Chesapeake 2000 Agreement specifies a goal to remove the Chesapeake Bay and its tidal tributaries from the list of impaired water bodies for nutrient and sediments by 2010. Thus, the development of a TMDL for these rivers is not being scheduled until 2010 anticipating that the Chesapeake Bay Program partners can cooperatively reach their goals and achieve water quality standards by that time making a bay wide TMDL unnecessary.

Substance

Please identify and explain the new substantive provisions, the substantive changes to existing sections, or both where appropriate. A more detailed discussion is required under the "All changes made in this regulatory action" section.

This provision adds numerical chlorophyll *a* criteria for the James River. These criteria are added to the special standards and designations (9 VAC 25-260-310) and listed in the river basin sections table for the James River (9 VAC 25-260-410). The criteria apply during the spring and summer months. Changes made since the June 28, 2005 adopted (with suspension) version include the adjustment of the spring criterion for the James mesohaline and polyhaline segments from 10 micrograms per liter (µg/l) to 12 µg/l, the summer criterion for the oligohaline segment

from 15 µg/l to 22 µg/l and the summer criterion for the lower tidal fresh region from 25 µg/L to 22 µg/L.

This provision also adds numerical dissolved oxygen criteria for the Mattaponi and Pamunkey Rivers. These criteria are added to the special standards and designations (9 VAC 25-260-310) and listed in the river basin sections tables for the York River (9 VAC 25-260-530). The criteria apply during the summer months and supersede the open-water criteria in subsection A of 9 VAC 25-260-185 that apply year-round to all tidal open-waters. There are no changes from the June 28, 2005 adopted (with suspension) proposal.

Issues

Please identify the issues associated with the proposed regulatory action, including:
1) the primary advantages and disadvantages to the public, such as individual private citizens or businesses, of implementing the new or amended provisions;
2) the primary advantages and disadvantages to the agency or the Commonwealth; and
3) other pertinent matters of interest to the regulated community, government officials, and the public.
If there are no disadvantages to the public or the Commonwealth, please indicate.

The public will benefit as implementation of these amendments will result in nutrient reductions in the James, Mattaponi and Pamunkey Rivers. This will result in protection of living resources and restoration of water quality in these rivers that are impacted by nutrient enrichment. Clean water with improved living resources can benefit the public through better recreational opportunities, employment opportunities (through tourism and commercial fisheries improvements), improvements in property values and quality of life in general to those who enjoy these tidal tributaries. The disadvantage is that certain sectors of the public may see these as too difficult and expensive to meet. However, the goal is to set realistic, protective goals in water quality management and to maintain the most scientifically defensible criteria in the water quality standards regulation.

The advantage to the Commonwealth is that the adoption of these criteria will define the necessary water quality and living resource goals needed for the development of tributary strategies as specified in the Code of Virginia § 2.2-219, Virginia Pollutant Discharge Elimination System permits (Chapter 3.1 of title 62.1 Code of Virginia) and for the development of total maximum daily loads (TMDL) under Section 303(d) of the Clean Water Act

There is no disadvantage to the agency or the Commonwealth that will result from the adoption of these amendments.

Pertinent matters of interest to the regulated community, government officials, and the public are the potential costs to meet the requirements of this regulation. The agency has also produced an analysis of alternative nutrient reduction loading scenarios for the James River and their corresponding chlorophyll *a* concentrations. This alternatives analysis was used, in part, to adjust the criteria in the lower tidal fresh, oligohaline, mesohaline and polyhaline segments of the James and is of interest to the regulated community, government officials, and the public.

Changes made since the June 2005 "Adopted-Suspended" stage

Please describe all changes made to the text of the regulation since the publication of the regulations adopted by the State Water Control Board on June 28, 2005, with the effective date suspended to allow for additional public comment. For the Registrar's office, please put an asterisk next to any substantive changes.

Section number	Requirement at Adopted-Suspended stage	What has changed	Rationale for change
9 VAC 25-260-310 paragraph bb	Chlorophyll *a* criterion in the lower tidal fresh James River is 25 µg/L Chlorophyll *a* criterion in the oligohaline James River for the summer is 15 µg/L Chlorophyll *a* criterion in the meso and polyhaline James River for the spring is 10 µg/L	Chlorophyll *a* criterion in the lower tidal fresh James River is 23 µg/L Chlorophyll *a* criterion in the oligohaline James River for the summer is 22 µg/L Chlorophyll *a* criterion in the oligohaline James River for the summer is 12 µg/L	Public comment indicated an analysis of alternative loading scenarios and chlorophyll *a* concentrations should be evaluated against environmental benefits. This analysis showed that the criteria could be adjusted based on attainability under reasonable loading reductions and still remain within scientifically defensible and protective ranges for aquatic life.

Public comment

The following includes public comments and agency responses to comments received during two comment periods associated with the adoption and suspension of effective date in June 2005. These included two comment periods (7/25/05 to 8/24/05 and 10/18/05 to 11/01/05).

Comment Period 7/25/05 to 8/24/05:

1. Comment: 382 citizens wrote in support of these water quality standards and for the Department to proceed without delay and start requiring reduction in nitrogen and phosphorus pollution from sewage treatment plants and industrial facilities. They are concerned that five years have elapsed since the Bay state Governors' commitments to achieve significant water quality improvements by 2010 and regulations have not yet been finalized.

DEQ Response:

DEQ appreciates the numerous letters of support and will work to complete this rulemaking. Please note that all other nutrient and suspended sediment criteria (dissolved oxygen, water clarity and narrative chlorophyll) are effective and waste load allocation requirements have been adopted for the Rappahannock, Potomac/Shenandoah and Eastern Shore.

2. Comment (Massanutten Chapter of Trout Unlimited): Same comment as in #1 above. Also, the 10 worst streams in both Rockingham and Augusta have nitrogen and turbidity levels 4-6 times "impaired" levels. If nothing is done to create tighter standards, in 6-10 years these levels will double. DEQ must adopt without delay and failure to do so will result in federal intervention.

DEQ Response: *Same response as in #1 above and agree that instream conditions could get worse without these rules and that EPA would adopt if the state had not already done so.*

3. Comment (William A. Stiles, Jr.): The actions that the Board takes on these regulations must be seen as directly linked to any future actions taken on the Nutrient Credit Exchange Program. The regulated community seems to be purposefully delaying and weakening the proposed regulations seemed to be to secure larger allocations for the point source dischargers and minimize the impact of limits beyond the general permit. As a citizen who will be affected by any increased utility rates, he feels these regulations are long overdue. If the regulated sector had moved to address nutrients years ago, the cost to the ratepayers would have been much less. The criteria originally proposed are appropriate given the continuing algal problems in spite of attainment of dissolved oxygen and water clarity goals. Does not support the increase of criteria in the tidal fresh from 20 to 25µg/l.
DEQ Response: *Agrees with the comment but believe the criteria adjustments are still protective and will lead to the needed nutrient reductions in the James River.*

4. Comment (F.L. Benson, Jr., John Murphy, Sarah Lewis, Paul Izzo, Mary F. Greenlee, Mark Endries, Scott Burger): Supports the regulations to control nutrient pollution to the James River for all citizens to protect our Nation's Founding River for our generation and our children. Harmful algae are a serious threat to the use of the river and clear standards are needed to ensure a healthy, balanced ecosystem. Without these standards the James Rivers will not receive the same level of clean up as the other rivers.
DEQ Response: *Agrees with the comment.*

5. Comment (Carey Whitehead): Same comments as #4. Also, The James has beauty, ecological wealth and national significance as the geographic landmark that fostered the birth of this nation. The recommendations for the chlorophyll standards were developed with support from the Chesapeake Bay Program model and although some may criticize this model as imperfect, it is world-class and the best tool for the science-based analysis that we have today. Urges us to look beyond the model limits to the potential for a clean river and Bay,
DEQ Response: *Agree with the comment and as the Bay model it updated and more is learned about chlorophyll and nutrient pollution in the James River, DEQ can use that information to update the criteria.*

6. Comment (Jennifer Rosko): Same comments as #4. Also, it is beyond imagination that with the knowledge we have today on how easy it is to destroy our natural resources and how difficult it is to clean / preserve them, that we are still allowing ourselves to make decisions that will directly contribute to the degradation of our state's most popular river.
DEQ Response: *Agree with the comment and assures the commenter that DEQ will not recommend an action that will result in degradation.*

7. Comment (Wayne Nystrom): As a landowner on the James River, he is very concerned about the particularly high level of algal growth this year. Supports the action to protect the precious and valuable James River.
DEQ Response: *Agree with the comment and note the high algal growth this year. Other areas of the James have also experienced algal blooms this year. The full implementation of this regulation will improve those conditions.*

8. Comment (Dotty Mills): Same comments as #4. Also, the Virginia Standards of Learning science objectives require that we teach our children to reduce, reuse, and recycle, to use rivers for recreation,

and to keep our environment clean for healthy wildlife. However, we adults are not keeping the James River clean for the children.
DEQ Response: *Agree with the comment and that this rule is necessary to begin the restoration of the James River for future generations.*

9. Comment (Judy Spencer): Same comments as #4. Also, as a 60-year old kayaking grandmother, it worried about the historic lands under attack by developers and that our heritage will not be known by the next generation, so it is vital that we fight to save it today, including the James River.
DEQ Response: *Agree with the comment and that this rule is necessary to improve the water quality in the James River for future generations. However, this rule will not prevent development, but proper land management is imperative to reducing nutrient pollution to the James River.*

10. Comment (Laura-Gray Street): Same comment as #4. Also, the issue of algae was recently made vivid in Lynchburg with an outbreak of toxic microcystis. The outbreak was in College Lake (Randolph-Macon Woman's College) which eventually drains into the James River. This local outbreak is just one of many reasons why algae standards are so necessary. Degraded water quality has prevented her children from enjoying our creeks and rivers to the full extend because of degraded water quality.
DEQ Response: *Agree with the comment and notes that the upstream dischargers of nutrients (including those around Lynchburg) will be required to reduce nutrient loadings as a result of this and other Bay related regulations.*

11. Comment (Powhatan Shores Homeowners' Association): Respectfully requests that the Board approve specific standards for chlorophyll to help ensure a clean James River that all citizens of Powhatan Shores and the Commonwealth can enjoy for generations to come. This association represents over 100 homes in James City County. Algae blooms are a serious threat to the river's ecosystem and inhibit our residents' use and enjoyment of the river. Years of study show that the standards are needed to prevent deterioration of the ecosystem.
DEQ Response: *Agree with the comment and that this rule is necessary to prevent further deterioration and improve the recreational quality in the James River.*

12. Comment (Marilyn Villanueva): The algae bloom in the James illustrates the damage being done to our Virginia rivers by pollution. Please stop the sewage and disposal of wastes into our rivers.
DEQ Response: *The James has experienced algal blooms this year. The full implementation of this regulation will improve those conditions.*

13. Comment (Bridget Westhoven): Supports stronger algae standards to protect Virginia waters from harmful algae outbreaks.
DEQ Response: *The full implementation of this regulation will improve those conditions.*

14. Comment (Chesapeake Bay Foundation):
These standards are imperative to restore water quality, uphold the State Water Control Laws and meet the goals of the Chesapeake 2000 Agreement. The current condition of Virginia's waters violates a myriad of state laws including maintenance of maintenance of designated uses such as a "balanced, indigenous population of aquatic life" (9 VAC 25-260-10) and general criteria that require "substances which nourish undesirable or nuisance aquatic plant life will be controlled." (9 VAC 25-260-20) Furthermore, Virginia's nutrient enriched waters regulations require the control of "undesirable growths

of aquatic plant life in surface waters." (9 VAC 25-260-330) Finally, the narrative chlorophyll-a criterion mandates that "concentrations of chlorophyll-a shall not exceed levels… undesirable… unsuitable… [or] ecologically undesirable…"(9 VAC 25-260-185) Water quality standards must employed to end the egregious violation of the laws of the Commonwealth.

DEQ Response:

DEQ agrees the criteria are needed to meet the regulations cited.

15. Comment (Chesapeake Bay Foundation):

Strongly supports the adoption of numeric chlorophyll criteria without further regulatory delay. The process has gone on for over 2 years and included all stakeholders. The point source community claims that is that being unfairly targeted for additional nutrient reductions and any further reductions should focus on non-point sources of nutrient pollution. Point sources are being asked to do their fair share as non-point source reductions have outpaced point source reductions in all rivers, except for one. For example, in the York River excess nitrogen from point sources currently accounts for 15% of the problem. Thus, point sources are being asked to fix roughly 15% of the problem, in fact they are being asked to fix only 13% of the problem. On the other hand, agricultural sources contribute to 39% of the problem in the York, yet they are being asked to fix 64% of the problem. CBF acknowledges the nutrient reduction progress that has been achieved with the point sources and supports funding for these efforts.

DEQ Response:

DEQ agrees the criteria should be adopted without unnecessary delay. There were concerns raised by the State Water Control Board at their June 28, 2005 meeting regarding giving ample time to stakeholders to review model results requested by stakeholders and the new loadings to the James in the Water Quality Management Planning Regulation. These results are completed and have been shared with the stakeholders. Because of the time needed to produce the model results and give all interested parties time to review the results, DEQ will wait until the November meeting for the Board to adopt these site specific standards. All other nutrient and suspended sediment criteria for dissolved oxygen, water clarity, submerged aquatic vegetation and a narrative chlorophyll criterion for the entire Bay and all tidal tributaries are effective and waste load allocation requirements have been adopted for three basins (Rappahannock, Potomac/Shenandoah and Eastern Shore).

16. Comment (Chesapeake Bay Foundation, James River Association):

James lower tidal fresh chlorophyll a standards must be set at 20µg/l as originally proposed and opposes the recent proposal to relax the chlorophyll-a standard in the James Lower Tidal Fresh to 25 ug/l. These standards are imperative to address water quality impairments and to end the violation of State Water Control Laws, especially in the James. EPA confirmed that the current science indicates summer nutrient criteria in tidal fresh waters can be established at levels even lower than 20 ug/L and recommended setting the standard at 15 ug/l. Contrary to the EPA's recommendation, there is now a proposal to relax the standard from 20 ug/l to 25 ug/l due to marginal questions regarding attainability. Water quality standards must first be established on what the science and the resources dictate. Compliance difficulties should be dealt with after full implementation of the water quality standards via variances. The uncertainties revolving around the attainability of these standards is marginal. The water quality modeling results for both the Virginia Tributary Strategy and its alternative scenarios show that a standard of 20ug/l would achieve levels within one percent of attainment. Any approach to setting water quality standards, which factors in minimal issues of

attainment is the functional equivalent of granting variances to point sources before any earnest attempt to achieve such a standard has ever been made.

DEQ Response: *EPA offered 15 µg/l as a potential criterion for the entire tidal fresh region and 20 µg/l as a potential criterion for the lower tidal James during the ad hoc process in 2004 (see http://www.deq.state.va.us/wqs/pdf/agmar24.pdf and http://www.deq.state.va.us/wqs/pdf/CHLORALL.pdf. EPA has since agreed that 25 µg/l is also protective of open water uses given that exact concentrations at which adverse impairments to aquatic life are certain to occur is not as quantitatively precise as the dissolved oxygen or water clarity criteria recommendations (EPA letter to DEQ August 25, 2005). However, final recommendations for this criterion were dependent on the results of several new model scenarios to determine if the proposed allocations or if higher allocations were appropriate to meet the standards DEQ and EPA agreed to complete these new model scenarios. These results show that a value of 23µg/l is attainable in the lower tidal fresh segment under the model results requested by the stakeholders and under the model scenario adopted (with suspension) by the Board on June 28, 2005. The model results requested by the stakeholders were also subject to additional public comment (October 18 – November 1). These comments and responses will be addressed separately.*

17. Comment (James River Association):
The James River suffers from unbalanced algae including undesirable and nuisance species, high algal concentrations contribute to an 85% decline in underwater grasses and local incidents of hypoxia are documented as a result of excess nutrient pollution. Strongly supports numerical chlorophyll criteria for accountability and enforcement that narrative criteria do not provide. The Commonwealth has extensive and solid information to set and support numerical chlorophyll standards for the James. Ten other states have set numeric algae standards without the benefit of the Chesapeake's world leading monitoring program. The impairments to the James River are a result of the cumulative impact of many sources of pollution, and the solution will be the cumulative benefit of many actions. Urges the Board to set the standards based on the strong science that has been provided and not to look at any one source in isolation. These standards have been under development for 5 years and it is imperative to complete this step toward restoring the health of the James River and other Virginia waters.
DEQ Response: *Agrees with most of these comments. Note that the science behind these criteria is still under technical development at EPA and EPA has stated that that "exact concentrations at which adverse impairments to aquatic life are certain to occur is not as quantitatively precise as the dissolved oxygen or water clarity criteria recommendations (EPA letter to DEQ August 25, 2005)".*

18. Comment (Chesterfield County, Hampton Roads Sanitation District, City of Hopewell, City of Lynchburg, South Central Wastewater Authority):
Agrees with and incorporated the Virginia Association of Municipal Wastewater Agency's comments. Do not support the nutrient allocations adopted by the Board as a commitment was made to conduct additional model runs to determine if the proposed allocations or if higher allocations are appropriate to meet the standards. To date, those runs have not been completed. These model runs should be completed as promised and a comment period should ensue to allow evaluation of these modeling results.
DEQ Response: *DEQ has worked with VAMWA to identify which additional model runs need to be run and provided the stakeholders an opportunity to provide public comment on these model runs. These scenarios will simulate varying levels of point source nitrogen and phosphorus discharge, and*

the resulting water quality conditions that will be evaluated in terms of compliance with the new tidal water quality standards. Also, see responses to VAMWA comments below # 21 – #53 below.

19. Comment (Environmental Protection Agency):
Supports the adoption of these chlorophyll criteria as they are consistent with EPA published guidance. Supports the adjustment from 20 µg/l to 25 µg/l in the lower tidal fresh James River and acknowledges the current state of the science for deriving numerical chlorophyll a criteria to protect designated uses is not as quantitatively precise as that supporting the published dissolved oxygen and water clarity criteria in terms of the exact concentrations at which adverse impairments to aquatic life are certain to occur. EPA believes the 25 µg/l criterion protects the open-water designated uses and requests the Virginia fully consider new scientific findings and enhanced information on attainability in future triennial reviews of the Commonwealth's water quality standards regulations.
DEQ Response: *Final recommendations for this criterion were dependent on the results of several new model scenarios to determine if the proposed allocations or if higher allocations were appropriate to meet the standards. These results show that a value of 23µg/l is attainable in the lower tidal fresh segment under the model results requested by the stakeholders and under the model scenario adopted (with suspension) by the Board on June 28, 2005. The model results requested by the stakeholders were also subject to additional public comment (October 18 – November 1). These comments and responses will be addressed separately.*

Updates to the criteria based on new information are always considered during triennial review. EPA has also convened a task force to reconsider the publication of numerical chlorophyll criteria for the Bay. However, due to antibacksliding requirements, upward adjustments of criteria may not be transferred to loading or concentration limit adjustments for permittees.

20. Comment (Sherilynn Hummel, MD, Burgess, VA):
Under a finely tuned constantly monitored state of the art nutrient reduction system may be able to meet 3.5 mg total nitrogen. If DEQ enacts nitrogen guidelines that are not possible to attain in many situations, compliance will be an issue. Enact strict guidelines that can be obtained. For example, consider guidelines that incorporate % reductions with a goal of 5 mg. Also background nitrogen levels in groundwater need to be taken into account. Other methods for reducing nitrogen (banning fertilizer within 250' of the water, land application of wastewater) should be encouraged. These guidelines must be funded, scientifically attainable and replicable. As new technologies become available, regulations can be changed.
DEQ Response: *Staff agrees that wastewater treatment plants have a critical role in reducing the overall nutrient loading to the Bay and tidal rivers. The allocations are set at levels that require the use proven nutrient reduction technologies. DEQ is instituting nitrogen loading requirements at levels similar to those suggested in this comment (between 3 mg/l and 8 mg/l). The levels are considered technology based concentration limits so they are attainable and replicable. Other nutrient management practices outside of point source nutrient controls are necessary to reduce nutrients entering the Bay watershed. The water quality in the Bay cannot improve to the levels necessary to restore living resources without these other removal options. The load reductions needed from alternate management practices are listed in the tributary strategies for the Bay. Funding for treatment upgrades and best management practices are available through low interest loans from the State Revolving Loan Fund and / or cost share grants from the Water Quality Improvement Fund.*

21. Comment (Virginia Association of Municipal Wastewater Agencies):
Incorporates by reference all previous comments and the proceedings of June 28, 2005 State Water Control Board on these regulations.
DEQ Response: *None needed.*

22. Comment (Virginia Association of Municipal Wastewater Agencies):
Questions the Department's integrity because the Department has not provided the modeling in a timely manner for this comment period as promised at the June Board meeting; the EPA told the Department that it would take18 months or 2 years to complete the requested modeling yet EPA was able to quickly provide two other model runs that DEQ requested.
DEQ Response*: New waste load allocations (WLA) recommended by DEQ staff for inclusion in the Water Quality Management Plan Regulations (9 VAC 25-720) were adopted by the State Water Control Board (SWCB) on June 28, 2005 (with a suspended effective date to receive additional public comment). As part of the adoption, a new model simulation was designed to test water quality responses to James River based on revised point source allocations adopted (with suspension) by the SWCB. Results of this model scenario are described in James River Alternatives Analysis Addendum dated August 11, 2005 and is referred to as the alternative Virginia tributary strategy for the James River (VATS JR Alternative).*

The 18 months referred to by the Virginia Association of Municipal Wastewater Agencies (VAMWA) was actually the time EPA estimated for one FTE (full time employee) to complete the assigned takes. However, such a task would be shared by at least 3 FTE's resulting in a schedule of about 6 months, not 2 years.

Immediately following the SWCB adoption (with suspension), DEQ staff developed the input deck requested by the Board with the revised waste load allocations (WLA) and submitted it to the EPA Chesapeake Bay Program office on July 05, 2005. EPA completed the requested simulation and submitted results to DEQ on July 25th for quality assurance. Results from this WLA scenario were subsequently shared with VAMWA on July 26th. However, an error was discovered and the problem "corrected" with the new run completed on August 5th and final results submitted on August 8th to DEQ for review. A final report for the alternative Virginia tributary strategy for the James River (VATS JR Alternative) was completed on August 11th. Rather than discard results from the "incorrect" WLA run, findings from this simulation were summarized as VATS JR Initial in Addendum #2 completed on August 18th. From the time of the SWCB adoption on June 28th till final results were completed, fifty-one days passed. During this same period VAMWA submitted several revisions to their list of model simulations. Their final submittal was received by DEQ on August 18th. A technical review of their proposal was summarized on August 26th as Addendum #3.

To date, fifteen scenarios have been completed to describe a suite of nutrient loadings for James River including the WLA adopted by the SWCB (James River Alternatives Analysis 2005; James River Alternatives Analysis Addendum & Addendum #2, 2005). As noted separately, spreadsheets can be used to compare various WLA adjustments including those proposed by VAMWA (2005a,b) without the need for additional model simulations (Addendum #3). The VAMWA (2005b and updated on August 18th) proposals for James River scenarios 1, 2 & 3 show delivered point source loads for total nitrogen between 12.8 and 14.4 (million pounds). These delivered total loads all fall

within completed scenarios and no new technical information would be gleaned from additional modeling exercises as proposed by VAMWA.

Since the comment was submitted DEQ and VAMWA have agreed to four additional modeling scenarios (two in the James and York). The results of these four runs are available and have been published in an Addendum #4 dated October 6, 2005. DEQ will not finalize the York and James WLA nor water quality standards until these results have been reviewed and commented upon by the stakeholders (as promised). The final recommendation will go before the Board in November 2005.

23. Comment (Virginia Association of Municipal Wastewater Agencies):
The proposed criteria for the summer TF1 segment should be at least 25µg/l. It is more ecologically protective as zooplankton levels are detrimental when chlorophyll falls below 20 and warmwater fisheries increase in productivity up to 20 – 40 µg/l.
***DEQ Response**: DEQ staff agrees that lake/reservoir fisheries productivity increases in freshwater systems above 20 µg/l until reaching a threshold at which chlorophyll becomes problem. DEQ staff agrees that a criterion above 20 µg/l is appropriate and originally recommended to the Board in June 2005 a value of 25 µg/l. However, final recommendations for this criterion were dependent on the results of several new model scenarios to determine if the proposed allocations or if higher allocations were appropriate to meet the standards. EPA and DEQ agreed to complete these new model scenarios. These results show that a value of 23 µg/l in the lower tidal fresh segment is attainable under the model results requested by the stakeholders and under the model scenario adopted (with suspension) by the Board on June 28, 2005. The model results requested by the stakeholders were also subject to additional public comment (October 18 – November 1). These comments and responses will be addressed separately.*

24. Comment (Virginia Association of Municipal Wastewater Agencies):
It is possible that such lower zooplankton food availability could be caused at least in part of excessive cyanophytes at elevated chlorophyll a concentrations. But Baywide monitoring clearly show that lower zooplankton food availability is also associated with very low chlorophyll concentrations in the tidal freshwater systems.
***DEQ Response:** Our analysis of area of good food availability can also correspond to lower chlorophyll a levels (Patuxent and Choptank 1999 -2002 chlorophyll <20 and FAI is "optimal" for these years). The food availability indices are appropriate only in the spring. The information VAMWA presented was summer.*

25. Comment (Virginia Association of Municipal Wastewater Agencies):
Do not agree that a simple elemental ratio analysis based on thresholds derived from the Ohio River is sufficient to refute the relation observed from actual monitoring data in the tidal fresh James, along the known increased productivity inherent in freshwater systems with longer retention times than nontidal streams such as the Ohio River.
***DEQ Response**: The thresholds used to assess food conditions in the James River were based on experiments performed using zooplankton collected from the Ohio River. The Ohio model consumers (Bosmina) are among the most common zooplankton found in rivers throughout the world (including the James River). Furthermore, their nutritional needs have been found to be quite consistent in a wide range of environments (inclusive of rivers, reservoirs and lakes). Therefore*

there is no a priori reason to expect that our findings should be specific to the system from which we collected the experimental animals (email from P. Bukaveckas to Alan Pollock October 10, 2005).

The second issue addresses how the Bukaveckas analyses (which is based in part on data from another system) should be viewed in light of site-specific monitoring information on chlorophyll and zooplankton abundance in the James. It should be noted that the former is based on experimental work (which allows control over confounding variables) while the latter is based on correlational analyses. While correlational analyses is useful in identifying potential causative factors it is often the case that correlation between two variables arises from their response to a third variable (rather than a causal relationship). In this case, co-occurrence of low chlorophyll and zooplankton abundance values may be due to their response to longitudinal variation in transit time (whereby short transit times in the upper river preclude develop of plankton communities) rather than an effect of one on the other (low chlorophyll concentrations causing diminished growth rates of zooplankton). The correlational analyses should not be given greater weight than the experimental-based findings even though the former are site-specific measures whereas the latter are only partly so (email from P. Bukaveckas to Alan Pollock October 10, 2005).

Recall also that the Bukaveckas analysis used a low end assumption to estimate the algal carbon fraction in the James and that it still was considered an algal-rich river even when a conservative estimate of the algal fraction was used. Recall that the scientists were also acknowledging that plankton was not the only source of food in the system and the estimates were conservative. This is one reason why the pristine Bay with its much lower chlorophyll levels, could still support a thriving aquatic life population. The main point is that even a 50% reduction from current chlorophyll levels would not result in zooplankton dietary limitation.

26. Comment (Virginia Association of Municipal Wastewater Agencies):
Agrees that is unlikely that a seasonal mean chlorophyll a of 20 µg/l would be associated with a significant productivity loss at any specific locations. However, as applied using the CFD approach attainment of a 20 µg/l standards at the chlorophyll peak in the TF1 segment would require chlorophyll significantly below 20 µg/l throughout much of the segment. It is unclear if VIMS considered this when they stated that they "do not believe the proposed chlorophyll standards pose a threat to the long-term productivity of …the James River."
***DEQ Response**: What is forgotten with this comment is that the implementation of these criteria will dampen the time and space of these 'peaks' such that levels significantly below 20 µg/l will not be 'necessary' to meet the criteria. VIMS scientists stated that given the proposed chlorophyll a criteria represent little change from current average seasonal conditions in the James River, they are actually an effective cap against degradation of they system as restoration activities are implemented. It seems from this statement that the VIMS scientists recognized the average nature of the value when giving us their recommendation.*

27. Comment (Virginia Association of Municipal Wastewater Agencies):
Attainability of the lower chlorophyll *a* targets in the tidal fresh segment is highly questionable.
***DEQ Response**: DEQ agrees that attainability of 20 µg/l is questionable under the loading scenarios being testing by the agency during this review period.*

28. Comment (Virginia Association of Municipal Wastewater Agencies):

The chlorophyll a criteria are scientifically unsupported in oligohaline, mesohaline, and polyhaline segments. No new information has been submitted by DEQ to support the direct relationship between the criteria and actual impairments. The criteria are arbitrary and subjective.
DEQ Response: *DEQ believes that imbalance, nuisance and undesirable conditions described in the VA DEQ November 2005 (rev. January 2005) Chlorophyll Technical Report sufficiently describes the impairment and provides the scientific argument for the basis of the criteria. DEQ recognizes the continuing technical concerns from the regulated community associated with the criteria in the meso and polyhaline segments. DEQ agrees 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 and still be protective of aquatic life uses in these segments. The results of the James River alternatives analysis suggest that a concentration of 12 µg/l is attainable in the lower James (mesohaline and polyhaline) and is attainable under the model results requested by the stakeholders and under the model scenario adopted (with suspension) by the Board on June 28, 2005. The model results requested by the stakeholders were also subject to additional public comment (October 18 – November 1). These comments and responses will be addressed separately.*

29. Comment (Virginia Association of Municipal Wastewater Agencies):
Virginia lacks an appropriate definition of "balanced" algal community for the James River.
DEQ Response: *DEQ has defined balance as characterized by lower chlorophyll levels, more stable community composition (i.e. less bloom frequency, stable proportions of taxonomic groups, and low biomasses of bloom forming species) and healthier cells with less phaeophytin and lower chlorophyll: carbon content as defined in Buchanan et. al. 2005 Phytoplankton Reference Communities for Present-Day Chesapeake Bay. Estuaries Vol. 28(1):138-159 and Marshall et. al. Seasonal phytoplankton associated with water quality criteria and salinity in Chesapeake Bay, (Submitted for publication). Reduced chlorophyll levels are associated with reference community conditions and achieving lower chlorophyll levels will also lead to less "undesirable or nuisance aquatic plant life" as evidenced by fewer cyanobacterium and less "red tide" dinoflagellate biomass (Marshall et. al. above). We recognize that VAMWA does not agree with our definition of 'balance' and the concentrations that accompany the reference condition.*

30. Comment (Virginia Association of Municipal Wastewater Agencies):
The DEQ heavily relied upon P-IBI and reference community approach simply represents the phytoplankton community loosely associated with certain light and nutrient concentration defined by regulators to represent desirable conditions. This is circular logic. Other phytoplankton communities may also be 'balanced' and supportive of ecological health and natural conditions.
DEQ Response: *DEQ has disagreed with this previously in our response to comment #25 in Summary and Response to Public Comment Amendments to Water Quality Standards for the James, Mattaponi and Pamunkey Rivers, June 2005. The comment states a disagreement with the approach of phytoplankton reference communities and associated index of phytoplankton biotic integrity (P-IBI) as published in the scientific peer reviewed literature (Buchanan et al. 2005 Phytoplankton Reference Communities for Chesapeake bay and its Tidal Tributaries) in defining a "balance, indigenous population" of algae and associated criteria chlorophyll levels. This reference community approach followed the procedure outlined/recommended by EPA for the development of regulatory biocriteria (Gibson et al. 2000 Estuarine and Coastal Marine Waters: Bioassessment and*

Biocriteria Technical Guidance. EPA 822-B-00-024). The connection between good water quality and balanced aquatic communities is well established and is not circular- it is direct. Comparison to reference communities to measure aquatic life uses is well established and used widely, particularly using benthic macroinvertebrates. DEQ staff believe the use of the phytoplankton IBI is appropriate useful metric along with other lines of evidence for characterizing a balanced phytoplankton community.

31. Comment (Virginia Association of Municipal Wastewater Agencies): The phytoplankton reference community is largely a function of water clarity. The James River Alternative Analysis shows only minimal gains in water clarity of even with shoreline erosion control. There is no hard evidence that major shifts in the algal community composition would occur. ***DEQ Response:*** *The phytoplankton reference community is a function of water clarity, dissolved inorganic nitrogen and phosphate and good water clarity is key for a healthy phytoplankton community. It is true that nutrient reductions cannot be expected "to cause shifts from "worst/poor" light conditions to "better/best" light conditions because non-algal suspended solids are a major cause of low light conditions throughout the James River" (VAMWA Comment #25 in Summary and Response to Public Comment Amendments to Water Quality Standards for the James, Mattaponi and Pamunkey Rivers, June 2005. Buchanan et al. (2005) state in their abstract "Improved water column transparency, or clarity, through the reduction of suspended sediments will be particularly important in attaining the reference communities. Significant nitrogen load reductions are also required."* ***We acknowledge that light is a major factor that needs to be addressed along with nutrient reductions to attain the expected phytoplankton community.*** *The James River Alternative Analysis (June 05) shows some gains in water clarity from 1985 – VATS; however it also shows very good water clarity in all the James River segments (>22%) under all scenarios (including 1985). This is contrary to data observations and VAMWA's own observation that the James has relatively high turbidity (VAMWA Comment #25 in Summary and Response to Public Comment Amendments to Water Quality Standards for the James, Mattaponi and Pamunkey Rivers, June 2005). Therefore, these water clarity modeling results may be highly suspect. This is not unexpected as the sediment transport is simplified and sediment loads from eroding stream banks are not well captured in the model. EPA is developing a detailed sediment transport and resuspension model which is expected to be complete in 2008.*

32. Comment (Virginia Association of Municipal Wastewater Agencies): The Buchanan 2005 reference shows higher dinoflagellates for the higher salinity regimes. This is a contradiction with statements made that nutrient reduction to compliance levels chlorophyll *a* levels would bring about balance that is in part defined by lower dinoflagellate abundance.
DEQ Response: *DEQ agrees that the reference mentioned shows that approximately half of the time, the least-impaired conditions had significantly higher dinoflagellate biomass than the impaired conditions. However, there was no difference in biomass between least-impaired and impaired the rest of the time. A main point is that reference community conditions have lower biomass of* ***undesirable*** *bloom forming dinoflagellates (P. minimum) as well as greater dinoflagellate cell size (more desirable as food to higher trophic levels) as shown in seasonal phytoplankton associated with water quality criteria and salinity in Chesapeake Bay (Marshall et al. submitted for publication).*

33. Comment (Virginia Association of Municipal Wastewater Agencies):The plankton IBI metrics include two parameters related to total algal biomass, including chlorophyll *a* itself. Attempting to justify chlorophyll *a* criteria using the P-IBI is circular and auto-correlated.
DEQ Response: *The IBI does include several parameters related to total algal biomass. Use of these parameters to 'score' a phytoplankton community using the P-IBI had a high degree of 'efficiency' for the whole Bay. Hence, the authors chose the parameters that were able to better discriminate between unimpaired and impaired. However, we still maintain that this is a good tool (along with other lines of evidence) that show the James is impaired or unbalanced.*

34. Comment (Virginia Association of Municipal Wastewater Agencies): The P-IBI metrics for the mesohaline and polyhaline James are biased toward negative scores. For several parameters, the only possible score is a "BAD" value of 1.
DEQ Response: *We agree that several of the metrics have no score listed under the GOOD column. This appears to be true for spring tidal fresh (Cyanophyte biomass), spring mesohaline (Prorocentrum abundance), spring polyhaline (total abundance) and summer tidal fresh (Microcystis abundance). For these parameters there appears to be no score for GOOD which could bias those scores negatively. However, each of these examples also has 7 -8 other parameters for which to 'score' the health of the segment. We still maintain that this is a good tool (along with other lines of evidence) that show the James is impaired or unbalanced.*

35. Comment (Virginia Association of Municipal Wastewater Agencies): The P-IBI classification efficiency for the James River is far below the classification efficiency for the whole Bay.
DEQ Response: *The classification efficiencies represent how well the station data P-IBI scores identify impaired and non-impaired sites. DEQ agrees that the classification efficiency using the James data is generally not as high as the entire Bay but it is close to or better than the entire Bay data set in the tidal fresh and oligohaline segments. The classification efficiency is the lowest in the mesohaline and polyhaline James segments. The average classification efficiency for the mesohaline and polyhaline segments (spring and summer) is just over 40% whereas the meshaline and polyhaline Bay classification efficiency is closer to 80% (the spring/summer IBI classifies good and bad sites correctly about 80% of the time when looking at all the Bay mesohaline and polyhaline data). The positive aspect for the all segments, including the mesohaline and polyhaline segments is that a very low percentage (e.g. about 2.2% at LE5.5 polyhaline) are total opposites (i.e. BAD habitat matched with good P-IBI or GOOD habitat matched with poor P-IBI). The rest of the P-IBI scores are one category 'off' (MIXED water quality conditions with poor scores and BAD water quality conditions with fair-poor, fair or fair-good scores). This still tell us that the P-IBI is a good tool (along with other lines of evidence) that show the James is impaired or unbalanced.*

36. Comment (Virginia Association of Municipal Wastewater Agencies): There is an extremely weak graphical relationship between the IBI scores and chlorophyll concentrations and thus attainment of the chlorophyll standards may not result in changes to the P-IBI scores.
DEQ Response: *DEQ agrees the mesohaline and polyhaline P-IBI scores show a weak relationship to chlorophyll. However, the P-IBI results are not only dependent on the chlorophyll metric. There are 6-8 other phytoplankton community metrics used to 'score' a segment which would also be expected to improve with attainment of the chlorophyll criteria. Therefore, it can only remain to be seen (when criteria are attained) if the combined impact of not only lower chlorophyll but also the other metrics would lead to better P-IBI scores. DEQ expects this to be the case.*

37. Comment (Virginia Association of Municipal Wastewater Agencies): PIBI methods should be subjected to the Administrative Process if they are to be used as a key element of regulatory actions.
DEQ Response: *The P-IBI was used as one of several reasons supporting the need for chlorophyll numerical criteria for the James (i.e. the P-IBI was one line of evidence used to identify the impairments of unbalanced aquatic life in the James River). Because there are other reasons that form the basis of these criteria (including attainability), the adoption of the P-IBI as biocriteria will not be considered.*

38. Comment (Virginia Association of Municipal Wastewater Agencies):
Even if chlorophyll was a good predictor of the P-IBI (which it is not), it could be concluded that no significant change in the P-IBI would occur.
DEQ Response: *The P-IBI may or may not change in response to nutrient reductions alone. Water clarity improvements are a key ingredient as well. Both must be implemented to improve the phytoplankton community composition.*

39. Comment (Virginia Association of Municipal Wastewater Agencies):
Because of the concerns surrounding the IBI, it should only be used to evaluate status and trends and not to support regulatory actions. A 'balanced' phytoplankton community definition should be based on the proportion and biomass of harmful/toxic taxa.
DEQ Response: *The P-IBI will continue to be used to evaluate status and trends. Regulatory actions for water quality standards development are frequently dependent on scientific findings such as that presented in the IBI. The IBI was used as tool, along with other lines of evidence including the presence of harmful taxa, to show the James is impaired or unbalanced.*

40. Comment (Virginia Association of Municipal Wastewater Agencies): The current levels of cyanophytes represent a clear departure from a "balanced" phytoplankton community; however, the nutrient-related impacts to the James River and benefits of the chlorophyll a criteria appear to have been overstated.
DEQ Response: *DEQ staff agrees that the current levels of cyanophytes represent a clear departure from a "balanced" phytoplankton community.*

41. Comment (Virginia Association of Municipal Wastewater Agencies): The nutrient-related impacts to the James River and benefits of the chlorophyll a criteria appear to have been overstated because the information about the status of fisheries in the James does not strongly implicate nutrients/chlorophyll as a major cause of fisheries problems on the river and benefits of the status of benthic macroinvertebrates in the James River has been firmly linked to sediment and habitat characteristics.
DEQ Response: *DEQ staff agrees that the nutrient / chlorophyll may not be the primary cause of fisheries problems in the river. However, when DEQ presented information on the status of fisheries, we were responding to the original VAMWA comment that the fisheries status in the James was healthy. We knew this not to be so and wanted to refute that statement. However, there is a vast body of ecological literature that supports the concept that the base of the food web (i.e. the algal community) strongly and directly influences higher levels of the food web which may be one reason why the ecology in the James is not healthy.*

The reference for the statement that "the status of benthic macroinvertebrates in the James River has been firmly linked to sediment and habitat characteristics" was from a limited study performed in 1971. Much more extensive benthic data collection and analyses has since been performed by the Chesapeake Bay Program. These results indicate that the benthic degradation causing regulatory impairment is related to sediment contaminants as well as nutrient eutrophication effects of either low dissolved oxygen or excessive organic productivity (2006 303d Assessment Methods For Chesapeake Bay Benthos, VERSAR and ODU, September 2005).

42. Comment (Virginia Association of Municipal Wastewater Agencies): The nutrient-related impacts to the James River and benefits of the chlorophyll a criteria appear to have been overstated because the there is no evidence the chlorophyll criteria will have any significant benefits to oysters or crabs.
DEQ Response: *DEQ staff agrees that the nutrients / chlorophyll may not provide significant benefits to oysters or crabs in the James River. However, loss of habitat due to environmental pollution, such as algal blooms deplete the water of oxygen, hindering the development of oyster larvae is one strategy needed to restore the oyster. Low dissolved oxygen is not as severe of a problem in the James River as some other Bay tributaries, although excessive algal blooms are seen and could affect oyster larvae. DEQ agrees the James River has one of the better oyster populations but that may be because of the lack of a severe chronic dissolved oxygen problem. Agreed the restoration of the crab population in the James River is dependent on many factors; however like other aquatic animals, blue crabs are vulnerable to summer's low oxygen conditions which can be fueled by the excessive algal blooms which remove oxygen from the water.*

43. Comment (Virginia Association of Municipal Wastewater Agencies): The nutrient-related impacts to the James River and benefits of the chlorophyll a criteria appear to have been overstated because references to SAV benefits are inconsistent with water quality modeling results and other information that produce negligible benefits to SAV from chlorophyll reduction.
DEQ Response: *DEQ staff agree the modeling shows that SAV improves with nutrient reduction but not to the restoration levels needed and the improvements of SAV vary little between the loading scenarios that were reviewed in the June 2, 2005 James River Alternative Analysis. However, these water clarity and SAV modeling results may be highly suspect because the sediment transport is simplified and sediment loads from eroding stream banks are not well captured in the model. EPA is developing a detailed sediment transport and resuspension model which is expected to be complete in 2008.*

44. Comment (Virginia Association of Municipal Wastewater Agencies): The nutrient-related impacts to the James River and benefits of the chlorophyll a criteria appear to have been overstated because DEQ presents no evidence that the phytoplankton composition of the higher salinity segments is insufficient to support desired levels of living resources or that attainment of proposed criteria would alter food quality of this region.
DEQ Response: *DEQ staff agrees that the phytoplankton composition may be sufficient to support higher trophic levels in the higher salinity segments but the current status points to degrading trends. For example, studies report poor status and degrading trends for dinoflagellates as well as poor status with total phytoplankton (as measured by biomass and biomass to cell abundance ratios). Also, in the Dauer, et al. 2005 document entitled Status and Trends in Water Quality and*

Living Resources in the Virginia Chesapeake Bay: James River (1985-2001) it is stated that "This region remains prone to sporadic and common summer and fall blooms of dinoflagellates."

45. Comment (Virginia Association of Municipal Wastewater Agencies): The nutrient-related impacts to the James River and benefits of the chlorophyll a criteria appear to have been overstated because the analysis of Dr. Paul Bukaveckas states that "*suspended matter in the James River is rich in its algal carbon fraction and its phosphorus and nitrogen content*" This argues against food quality limitations of this system.
DEQ Response: *DEQ believes this argues against the food quantity limitations of the system and not the food quality limitations. Dr. Bukaveckas further clarified this statement by stating that the "derivation of the algal fraction of suspended matter is based on measurements of total chlorophyll (not size fractionated)." Algal communities may on occasion be dominated by large cells or colonies that are inedible to some consumers. Under these conditions, estimates of the edible algal fraction would be smaller than the total algal fraction.*

46. Comment (Virginia Association of Municipal Wastewater Agencies): The nutrient-related impacts to the James River and benefits of the chlorophyll a criteria appear to have been overstated because the Buchanan 2005 reference does not show an increase in diatoms at reference conditions.
DEQ Response: *While many of the salinity regimes show no change in diatom biomass, the seasons that we are interested in (spring and summer) show the mesohaline reference segment with higher biomass diatoms in the spring and higher biomass diatoms in the summer in the polyhaline segment. It's true that the other salinity regimes during spring and summer do not show the expected results which would be to see more diatom biomass in the reference site compared to the impaired site. However, we still maintain that the Buchanan 2005 reference is a good tool (along with other lines of evidence) that show the James is impaired or unbalanced.*

47. Comment (Virginia Association of Municipal Wastewater Agencies): DEQ should show restraint with such claim concerning benefits of the chlorophyll criteria with clear differentiation between benefits that are likely (e.g., reduction of cyanophyte biomass in the tidal freshwater segment), possible (improvements to fisheries in this segment from reduced cyanophytes) and unlikely (significant changes to oysters, crabs, SAV, etc).
DEQ Response: *DEQ agrees that associated qualifiers in statements of benefit may be useful. We also believe a 'likely' benefit is the improvement of balance in the phytoplankton community composition in some segments (e.g. tidal fresh and oligohaline), the' possible' reversal of degrading phytoplankton trends in the lower James (meso and polyhaline) segments and the 'likely' benefit of maintaining chlorophyll levels in the lower James. Another likely benefit is the reduction in undesirable 'blooms' in all segments of the James.*

48. Comment (Virginia Association of Municipal Wastewater Agencies): Concerns with the cumulative frequency distribution (CFD) approach in conjunction with the chlorophyll *a* standard. Concerns include: the CFD curve would be developed with only three data points and questions of attainment would be highly influenced by the angular shape of the 3-point curve and a statistical significance test or biological reference curve has not been developed. All this could lead to very small portions of segments exerting a great deal of control over attainment decisions (as discussed in comment #26)

DEQ Response: *DEQ staff disagrees with this statement and the respondent's assessment of the cumulative frequency distribution (CFD) as no "statistical validity." The rationale behind the CFD-based attainment assessment is to derive and employ a valid method to distinguish natural episodes classified as acceptable from persistent and wide spread impairment identified as unacceptable or in non-attainment. Such an approach must include a reasonable assessment of the magnitude and duration in both time and space of acceptable and unacceptable conditions as provided by the CFD process.*

Phytoplankton as measured by chlorophyll-a concentration are inherently variable in space and time. Populations typically occur in patches with blooms occurring sporadically. Therefore, it is important to recognize that natural algal blooms can and do occur beyond a predetermined threshold over the season (time) of interest over some predefined space (segment). Some blooms are natural and may not represent persistent impairments of a segment. Therefore, an assessment methodology should allow for these conditions to be classified as acceptable while conditions of persistent and wide spread impairment be identified as unacceptable or in non-attainment.

During the Standards ad hoc Advisory Meetings of 2005, VAMWA and their consultants stressed the need for a method(s) to include the properties described above. The CFD methodology used in this assessment involves the use of two dimensional space of percent time and percent space. It is based on sound statistical properties widely used in reliability and life sciences data analysis. Magnitude is defined by the criterion. For example, if a threshold of 25 µg/L is set in the lower tidal fresh James River during the summer, duration defined by time of exposure. A reference curve allows for natural background events. A particular plotting formation used in the James River Alternatives Analysis was used that placed the mean 3-year assessment closer to the 10-year assessments. This particular plotting position is recommended for lognormal distributions such as chlorophyll and served to address another VAMWA concern discussed in the James River Alternatives Analysis. Therefore, the CFD methodology uses a sound "statistically valid" probabilistic approach to address the key components of an attainment assessment. In fact, the current approach incorporates adjustments to both the reference and CFD curves that is very conservative, allowing for more attainment of excursions above the threshold than a non-adjusted curve would allow.

The respondent proposed a" simple spatial averaging" be considered. While simple, such an approach fails to include the most basic components to assess water quality parameter determination as outlined above and previously detailed as necessary. Therefore their proposal is not appropriate to test the most basic statistical requirements needed for this type of environmental assessment.

49. Comment (Virginia Association of Municipal Wastewater Agencies): DEQ has not proposed true adaptive management. True adaptive management would involve adopting chlorophyll *a* criteria for the tidal fresh segment where there is a high confidence in a direct linkage between chlorophyll *a* and actual use impairment. Non-regulatory approaches and antidegradation policies should be used elsewhere to track chlorophyll reductions and ecological changes that will result from nutrient reductions in the James and Bay. The triennial review can hardly be said to encourage readjustment of goals once wasteload allocations are put into permits and anti-backsliding provisions prevent 'adjustments' of those allocations.

DEQ Response: *DEQ and VAMWA disagree about the concept of adaptive management. DEQ believes there have been many non-regulatory approaches to Bay restoration and 'tracking' or monitoring of that progress. Yet, we still have impairments after 20 years of this type of management (adaptive may not be the correct term) scenario. We agree that it will be difficult to adjust permit limits upward once implemented into permits. This was not considered in DEQ's earlier response. However, we believe that a regulatory approach via adoption of criteria is necessary to hold chlorophyll concentrations at an acceptable level via concurrent nutrient reductions as there could be significant degradation to water quality as water clarity improves.*

50. Comment (Virginia Association of Municipal Wastewater Agencies): Modeling shows flat environmental responses to nutrient reduction in the mesohaline and polyhaline James River. Variations in total nitrogen loading at levels of 1 million lbs/yr can be expected toresult in (a) 3-year average chlorophyll response of 0.2 µg/l, and (b) zero to1 µg/l differences in CFD-based chlorophyll *a* attainment. Therefore, the more cost effective nutrient allocation scenarios should be considered for the lower James River.
DEQ Response: *There are small differences in chlorophyll concentrations between the Virginia Tributary Strategy loading scenarios for the meso and polyhaline segments. The criteria are attainable at 12µg/l under the model results requested by the stakeholders and under the model scenario adopted (with suspension) by the Board on June 28, 2005. This allows for a more cost effective nutrient reduction scenario for these segments of the James. The model results requested by the stakeholders were also subject to additional public comment (October 18 – November 1). These comments and responses will be addressed separately.*

51. Comment (Virginia Association of Municipal Wastewater Agencies): Previous responses from DEQ to VAMWA comments indicate that VAMWA recommends only sediment controls. However, the point VAMWA was making was that problems with water clarity are largely due to sediment. VAMWA recommends both nutrient and suspended sediment controls and does not believe that the VAMWA management recommendations (tidal fresh chlorophyll chlorophyll reductions and a water quality antidegradation approach for the meso and polyhaline) will allow increases in chlorophyll concentrations as water clarity improves (the model shows decreasing chlorophyll).
DEQ Response: *DEQ agrees that the model shows decreasing chlorophyll concentrations under the management scenarios presented by VAMWA.*

52. Comment ((Hampton Roads Sanitation District): Agrees with the Virginia Association of Municipal Wastewater Agencies comments and incorporates by references all comments previously submitted by VAMWA and HRSD.
DEQ Response: *No response needed.*

53. Comment (Virginia Association of Municipal Wastewater Agencies):VAMWA recommends that the Board adopt a criterion of at least 25 for the summer lower tidal fresh segment, and employ a true adaptive management approach that considers the possibility of both food quality and quantity effects in this segment. DEQ should use antidegradation policies and non-regulatory approach to manage nutrient loads in other segments. If it is desired to adopt numeric chlorophyll a criteria for these segments in the future, they should be based on a clear definition of phytoplankton goals that are appropriate for the James River, realistic, and meaningful in an overall ecological context.

DEQ Response: *DEQ does not agree that numerical criteria are unnecessary in these segments. VIMS scientists (May 24, 2005 letter from Roger Mann to Alan Pollock) believe that without constraints on chlorophyll levels (via chlorophyll numerical criteria), reducing suspended sediment levels through restoration efforts will almost certainly result in significant increased in algal populations as those populations take advantage of increased light availability to utilize excess nutrients already in the system. Without criteria to hold chlorophyll concentrations at an acceptable level via concurrent nutrient reductions, there could be significant degradation to water quality as water clarity improves.*

DEQ acknowledges that the state of the science for deriving numerical chlorophyll a criteria to protect these designated uses is not as quantitatively precise as that supporting the published dissolved oxygen and water clarity criteria in terms of the exact concentrations at which adverse impairments to aquatic life are certain to occur. At the same time, there is evidence of impairments within the tidal James River and a documented need for the adoption of numerical chlorophyll a criteria to address those impairments and meet designated uses. The results of the James River alternatives analysis suggest that a concentration of 12 µg/l is attainable in the lower James (meso and polyhaline) under the model results requested by the stakeholders and under the model scenario adopted (with suspension) by the Board on June 28, 2005. These model results requested by the stakeholders were also subject to additional public comment (October 18 – November 1). These comments and responses will be addressed separately.

Comment Period 10/18/05 – 11/01/05

54. Comments: (Chesapeake Bay Foundation, Chesterfield County, Environmental Protection Agency, Hampton Roads Sanitation District, Hanover County, Hopewell Regional Wastewater Treatment Facility, James River Association, City of Lynchburg, City of Richmond, South Central Wastewater Treatment Authority, Virginia Association of Municipal Wastewater Agencies):
Many comments from these individuals were primarily directed toward the Water Quality Management Planning Regulation. The Hampton Roads Sanitation District and the South Central Wastewater Treatment Authority also supports the comments provided by VAMWA under this comment period.
DEQ Response: *Responses provided under the Board memo for the Water Quality Management Planning Regulation for the James and York Rivers.*

55. Comment: (W. Lee Chamberlain): Wants more regulatory requirements for the dischargers and believes the regulations fall short of being proactive to improved dissolved oxygen or restrict eutrophication of the James River and Chesapeake Bay.
DEQ Response: *The Board must take into account various factors including the ecological needs of the waters, reasonableness and attainability in adopting regulations. Modeling results show that improvements in water quality will be realized as these regulations are implemented.*

56. Comment: (James River Association):
DEQ and EPA have gone well out of their way to accommodate the modeling scenarios requested by interested parties. The level of analysis conducted on the James River provides more than adequate information on which to base the water quality criteria and waste load allocations. The analysis shows the chlorophyll levels respond to the location and size of the pollution load. The results show

that a summer tidal fresh criterion of 23 µg/l is attainable and urged the State Water Control Board to make this change and to give final approval for the recommended chlorophyll *a* standards.

57. Comment: (Chesapeake Bay Foundation):
It is imperative the Commonwealth finalize the regulatory development process in November and transition quickly into implementation as this process has been ongoing for almost 2.5 years at the state level and prior to that development at the federal level encompassed several years of intense work. Supports the criteria adjustments for summer lower tidal fresh of 23 µg/l (from 25µg/l) and the spring mesohaline and polyhaline of 12 µg/l (from 10 µg/l).
DEQ Response: *DEQ agrees. However, we recommend one additional adjustment in order to maintain consistency with the basis of all the criteria. We believe the summer oligohaline segment should be adjusted to 22 µg/l from 15 µg/l based on attainability under model scenarios that will require nutrient reductions, result in water quality improvements and remain within protective values that are acceptable to EPA and the DEQ. See response to comment #58 below.*

58. Comment: (Virginia Association of Municipal Wastewater Agencies):
Appreciates the Board's decision in June to suspend the regulation and defer any appeals that may have otherwise resulted from the June 2005 staff recommendations. The modeling efforts were time and resources well spent and provides a clear and rational basis to resolve the outstanding allocation concerns.

The chlorophyll criterion for the lower tidal fresh segment of the James River should be maintained at 25 µg/l. Results of model scenarios JY1 and JY2 predict an attainable criterion of 23 µg/l and we understand that DEQ is considering recommending 23 µg/l. This should not occur because as described in VAMWA's and EPA's previous comments, 25 µg/l is environmentally protective. Also, while the model results are generally sufficient to guide the standards setting and allocation setting processes, there is a small amount of uncertainty associated with the very specific values like 23 µg/l. Even if the model were perfectly accurate, setting the criterion at exactly 23 µg/l would be setting the goal at the brink on non-attainment.

Model results indicate that the chlorophyll a criterion for the summer oligohaline, spring mesohaline and spring polyhaline segment should also be increased slightly. This is because these criteria are not attained under any of the VATS scenarios, criteria should not be set at the brink of non-attainment, the criteria are subjective and they still represent significant reductions from 1985 and 2002. For the spring meso and polyhaline, these segments should reflect the natural spring bloom phenomenon and criteria values of 15 µg/l are recommended for these segments. Attainment is not achieved in the summer oligohaline under any control scenario and the water quality response to increased controls is flat. Recommend a criterion of 25 µg/l for this segment.
DEQ Response: *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. There are four segments that VAMWA has concerns about in their comments and DEQ agrees these criteria could be adjusted based on attainability and will remain protective of designated uses based on the available scientific findings. These scientific findings*

include many sources of literature many of which are referenced in the Department of Environmental Quality Technical Report, Chlorophyll a Numerical Criteria for the Tidal James River, November 30, 2004 (revised 1/12/2005) and the EPA Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for the Chesapeake Bay and Its Tidal Tributaries, April 2003.
The results of the James River alternatives analysis suggest that a concentration adjustment from 10 µg/l to 12 µg/l in the mesohaline and polyhaline segments, from 15 µg/l to 22 µg/l in the summer oligohaline and from 25 µg/l to 23 µg/l in the summer lower tidal fresh meets those requirements. Note that the adjustment of the oligohaline value, while a larger adjustment than seen in the other segments, also better reflects the type of algal community present in the lower salinity waters (it is similar to the lower tidal fresh segment) and the science behind the basis of the lower salinity waters. We do not agree to adjust the values higher based on model uncertainties as VAMWA suggested as we must also respond to comments from the environmental groups who believe that the adjustment of the values should be minimal beyond what was originally proposed. We also believe the VAMWA concerns will be addressed as biological reference curves are developed in the future for use in assessing attainments of these chlorophyll criteria.

59. Comment: (Hampton Roads Sanitation District):
Agrees with the VAMWA comments. Includes the comment that a criterion of 15 µg/l in the meso and polyhaline segments of the James is representative of proposed anti-degradation levels in their discharge which is what VIMS and DEQ have suggested previously. They also point out that a criterion of 12 µg/l in the meso and polyhaline segments should be increased because the model outputs on which attainability is being judged is relative to 10 year periods and the compliance period in the monitoring program is a 3-year period which may result in greater non-attainment. HRSD has long held that the technical basis for the establishment of numerical chlorophyll in the lower estuary is indefensible. Any slight adjustment is not ecologically significant.
DEQ Response: *DEQ is willing to adjust the values as described in the response to the VAMWA comment above.*

60. Comment: (Environmental Protection Agency, Region 3):
EPA fully supports and expects the adoption of the numeric chlorophyll criteria for the tidal James River. They also support the adjustments of criteria based on the results of the James River Alternatives Analyses in the summer lower tidal fresh from 25 µg/l to 23 µg/l and the spring meso and polyhaline from 10 µg/l to 12 µg/l. EPA recognizes 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 the published dissolved oxygen and water clarity criteria in terms of the exact concentrations at which adverse impairments to aquatic life are certain to occur. At the same time, there is clear evidence of impairments within the tidal James River and a documented need for the adoption of numerical chlorophyll a criteria to address those impairments and meet designated uses. These concentrations applied as seasonal means and assessed as proposed in the Virginia water quality standards regulations using the proposed criteria attainment assessment procedures will protect against the adverse effects of harmful algal blooms, provide for a healthier aquatic food web and lead to a more balanced, indigenous population of algae. This proposed criterion has been documented as attainable when the nitrogen and phosphorus cap load allocations currently being considered by Virginia for the James River basin are fully achieved.

DEQ Response: *DEQ agrees. However, we recommend one additional adjustment in order to maintain consistency with the basis of all the criteria and to respond to comments received in this comment period from the Virginia Association of Municipal Wastewater Agencies. We believe the summer oligohaline segment should be adjusted to 22 µg/l from 15 µg/l based on attainability under model scenarios that will require nutrient reductions, result in water quality improvements and remain within protective values similar to the lower tidal fresh segment that are acceptable to EPA and the DEQ. Therefore, while the adjustment of the oligohaline value is larger than seen in the other segments, it also better reflects the type of algal community present in the lower salinity waters.*

All changes made in this regulatory action

Please detail all changes that are being proposed and the consequences of the proposed changes. Detail new provisions and/or all changes to existing sections.

Current section number	Proposed new section number, if applicable	Current requirement	Proposed change and rationale
9 VAC 25-260-185.A	9 VAC 25-260-310 paragraph aa	In subsection A of 9 VAC 25-260-185 the current requirement is: Open-water year-round 30-day mean dissolved oxygen ≥5.5 mg/L in low salinity waters 30-day dissolved oxygen instream criteria ≥5 mg/L in higher salinity waters (≥0.5 parts per thousand) 7-day mean ≥ 4 mg/l Instantaneous minimum > 3.2 mg/l at temperatures <29°C Instantaneous minimum > 4.3 mg/l at temperatures > 29°C	In paragraph aa of 9 VAC 25-260-310 the proposed change is: Open-water summer (June 1 – September 30) 30-day mean dissolved oxygen ≥ 4.0 mg/l Instantaneous minimum ≥ 3.2 mg/l at temperatures <29°C Instantaneous minimum ≥ 4.3 mg/l at temperatures ≥ 29°C These site-specific criteria supersede the current requirements in the summer. The rationale of this proposed change is described in the 'Need' section above.
9 VAC 25-260-185.C	9 VAC 25-260-310 paragraph bb	Narrative Criteria as follows March 1 – September 30: Concentrations of chlorophyll *a* in free-floating microscopic aquatic plants (algae) shall not exceed levels that result in undesirable or nuisance aquatic plant life, or render tidal waters unsuitable for the propagation and growth of a balanced, indigenous population of aquatic life or otherwise result in ecologically undesirable water quality conditions such as reduced water clarity, low dissolved oxygen, food supply imbalances, proliferation of species deemed potentially harmful to aquatic life or humans or aesthetically objectionable conditions.	In paragraph bb of 9 VAC 25-260-310 the proposed change is: Open-water numerical chlorophyll *a* criteria apply spring (March 1 - May 31) and summer (July 1-September 30) as seasonal means to the tidal James River (excludes tributaries) segments. James River Segment (spring criterion µg/l/summer criterion µg/l) JMSTF2 (10/15) JMSTF1 (15/23) JMSOH (15/22) JMSMH (12/10) JMSPH (12/10) The rationale of this proposed change is described in the 'Need' section above.

Regulatory Flexibility Analysis

Please describe the agency's analysis of alternative regulatory methods, consistent with health, safety, environmental, and economic welfare, that will accomplish the objectives of applicable law while minimizing the adverse impact on small business. Alternative regulatory methods include, at a minimum: 1) the establishment of less stringent compliance or reporting requirements; 2) the establishment of less stringent schedules or deadlines for compliance or reporting requirements; 3) the consolidation or simplification of compliance or reporting requirements; 4) the establishment of performance standards for small businesses to replace design or operational standards required in the proposed regulation; and 5) the exemption of small businesses from all or any part of the requirements contained in the proposed regulation.

Many alternatives were considered as part of the development of these water quality standards. The agency conducted an alternative analysis to consider the benefits, detriments and costs of a range of nutrient loading scenarios and the corresponding predicted chlorophyll *a* levels. The alternatives analysis showed that acceptable chlorophyll *a* concentrations and other environmental benefits could be achieved in many segments of the James under various nutrient loading scenarios. As a result of this analysis and public comment, staff adjusted several of the criteria so that they are attainable, reasonable and protective of designated uses.

The water quality standards considered in this rulemaking are part of the Commonwealth's comprehensive initiative to restore water quality in Virginia's Bay waters and protect designated uses in the Bay and the tidal portions of its tributary rivers. These standards will be implemented through waste load allocation requirements present in the Water Quality Management Planning Regulation (9 VAC 25-720) and the Regulation for Nutrient Enriched Waters (9 VAC 25-40). The Administrative Process Act specifies that alternative regulatory methods include, at a minimum: 1) the establishment of less stringent compliance or reporting requirements; 2) the establishment of less stringent schedules or deadlines for compliance or reporting requirements; 3) the consolidation or simplification of compliance or reporting requirements; 4) the establishment of performance standards for small businesses to replace design or operational standards required in the proposed regulation; and 5) the exemption of small businesses from all or any part of the requirements contained in the proposed regulation. These specific alternative methods have been included as part of those implementation regulations (Water Quality Management Planning Regulation (9 VAC 25-720) and the Regulation for Nutrient Enriched Waters (9 VAC 25-40)).

General regulatory flexibility is included in the water quality standards regulation under 9 VAC 25-260-140.E (Variances to Water Quality Standards). Variances to numeric criteria may be granted under the following conditions:

1. Naturally occurring pollutant concentrations prevent the attainment of the use;
2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating state water conservation requirements to enable uses to be met;
3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place;
4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use;

5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
6. Controls more stringent than those required by §§ 301(b) and 306 of the Clean Water Act would result in substantial and widespread economic and social impact.

Variances shall not prevent the maintenance and protection of existing uses or exempt the discharger or regulated activity from compliance with other appropriate technology or water quality-based limits or best management practices.

It should be noted that the no small businesses are expressly exempted from the water quality standard regulations. However, the implementing regulations that accompany these water quality standards for the Chesapeake Bay and tidal tributaries apply to significant dischargers of nutrients (Water Quality Management Planning Regulation (9 VAC 25-720) and the Regulation for Nutrient Enriched Waters (9 VAC 25-40)). There are thresholds of 'equivalent loads' that may exclude or exempt small businesses from the requirements, depending on the magnitude of their annual discharged total nitrogen and total phosphorus loads specified in those implementing regulations.

Family impact

Please assess the impact of the proposed regulatory action on the institution of the family and family stability including to what extent the regulatory action will: 1) strengthen or erode the authority and rights of parents in the education, nurturing, and supervision of their children; 2) encourage or discourage economic self-sufficiency, self-pride, and the assumption of responsibility for oneself, one's spouse, and one's children and/or elderly parents; 3) strengthen or erode the marital commitment; and 4) increase or decrease disposable family income.

The development of water quality standards in general is for the protection of public health and safety, which has only an indirect impact on families. However, the regulatory action may decrease the disposable family income as localities upgrade their treatment facilities and pass the increased water and sewer costs to the ratepayers.