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Proposed Regulation Agency Background Document

Agency name	State Water Control Board
Virginia Administrative Code (VAC) citation(s)	9 VAC 25-260-310
Regulation title(s)	Water Quality Standards
Action title	Amendments to the tidal James River special standard for chlorophyll-a
Date this document prepared	August 13, 2018

This information is required for executive branch review and the Virginia Registrar of Regulations, pursuant to the Virginia Administrative Process Act (APA), Executive Orders 17 (2014) and 58 (1999), and the *Virginia Register Form, Style, and Procedure Manual*.

Brief summary

Please provide a brief summary (preferably no more than 2 or 3 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of the proposed new regulation, proposed amendments to the existing regulation, or the regulation proposed to be repealed.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.

The proposed amendments includes modified and new site-specific chlorophyll-a criteria applicable to the tidal James River. Chlorophyll-a criteria enable watershed management of nitrogen and phosphorus, nutrients which drive algal blooms in the tidal James River. The proposed amendments are the result of a comprehensive scientific study overseen by DEQ that focused on chlorophyll-a dynamics and linkages to aquatic life effects in the James River. Among the most notable changes to the regulation are modified seasonal mean criteria (eight proposed criteria are lower than the existing criteria and two proposed criteria are higher) and new short-duration criteria that protect aquatic life from the effects of toxic algae. Additionally, new language describing how data should be analyzed and the allowable exceedence frequencies for both sets of criteria will be inserted into the regulation.

Acronyms and definitions

Please define all acronyms used in the Agency Background Document. Also, please define any technical terms that are used in the document that are not also defined in the “Definition” section of the regulations.

DEQ = Department of Environmental Quality

EPA = United States Environmental Protection Agency

Legal basis

Please identify the state and/or federal legal authority to promulgate this proposed regulation, including: 1) the most relevant citations to the Code of Virginia or General Assembly chapter number(s), if applicable; and 2) promulgating entity, i.e., agency, board, or person. Your citation should include a specific provision authorizing the promulgating entity to regulate this specific subject or program, as well as a reference to the agency/board/person’s overall regulatory authority.

Section 62.1-44.15(3a) of the Code of Virginia, as amended, 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 promulgating entity is the State Water Control Board.

The corresponding federal water quality standards regulation at 40 CFR 131.6 describes the minimum requirements for water quality standards. The minimum requirements 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 Environmental Protection Agency (EPA) Water Quality Standards regulation (40 CFR 131.11) is the regulatory basis for the EPA requiring the states to establish water quality criteria to protect designated uses and the criteria are used to assess whether or not a waterbody is meeting those uses.

Purpose

Please explain the need for the new or amended regulation. Describe the rationale or justification of the proposed regulatory action. Describe the specific reasons the regulation 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.

The proposed amendments to the special standards and requirements section (9 VAC 25-260-310) of the Virginia Water Quality Standards Regulation reflects new understanding resulting from a seven-year-long study aimed at updating the chlorophyll-a criteria for the tidal James River with best available science. Chlorophyll-a criteria, which enable the regulatory management of nutrients (nitrogen and phosphorus), were adopted for the tidal James River in 2005. The scientific basis of the existing James River chlorophyll-a criteria was questioned in response to the stringent nutrient load reductions determined by the EPA to be necessary for attainment of these criteria.

The study of the existing regulation revealed some substantial weaknesses. First, the existing chlorophyll-a criteria were developed from datasets that were relatively limited in scope and were drawn from areas

of the Chesapeake Bay that may not be representative of the James River. Secondly, while the existing criteria were developed to promote a balanced phytoplankton assemblage that is relatively free from harmful taxa, the absence of clear relationships between chlorophyll-*a* and phytoplankton composition necessitated some subjective decision-making in the selection of thresholds. Also, physicochemical effects stemming from algal blooms, like poor water clarity and high pH, were not considered when the existing criteria were developed. Thirdly, the study found that the existing criteria must be assessed as geometric means (as directed by implementation guidance specified in subsection D of 9 VAC 25-260-185) even though they were developed as arithmetic means. Research conducted by the EPA-Chesapeake Bay Program Office in 2010 determined that the geometric mean is the more appropriate statistic for characterizing James River chlorophyll-*a* central tendency. Finally, the existing assessment methodology and the rules used to delineate allowable exceedence frequency, both described in references cited in subsection D of 9 VAC 25-260-185, were developed separately from the existing criteria and were found to be ill-suited for a parameter like chlorophyll-*a*, which can vary considerably in space and time even under ideal conditions. The mismatch between these elements and the existing criteria likely accounts for some of the stringency of the nutrient load reductions determined by EPA under the Chesapeake Bay Total Maximum Daily Load (TMDL) to be necessary for criteria attainment. Another factor was the modeling framework used at the time had limitations in its ability to accurately predict chlorophyll concentrations resulting from simulated nutrient reduction scenarios. An enhanced model is now being used in the analysis with improved calibration and validity.

The proposed amendments to the regulation address the above weaknesses. DEQ staff have concluded that implementation of the proposed amendments will benefit the health, safety and welfare of the citizens of the Commonwealth by protecting the water quality and living resources of the tidal James River from the harmful effects of excessive nutrients.

Substance

Please briefly identify and explain the new substantive provisions, the substantive changes to existing sections, or both. A more detailed discussion is provided in the “Detail of changes” section below.

9 VAC 25-260-310 (bb) provides the criteria for site-specific chlorophyll-*a* levels in the tidal James River (excluding tributaries) and contains a table listing two seasonal mean criteria (spring and summer) for each of the five James River segments (delineated by salinity regime), for a total of ten paired sets of criteria. The proposed amendments would lower eight of these values and raise two of them. Compliance with these revised criteria should minimize both long-term and short-term effects on aquatic life attributable to algal blooms. Additionally, a new table of criteria that apply only during the summer would be inserted. Compliance with these new criteria should minimize short-term effects on aquatic life stemming from potentially toxic harmful algal blooms. Finally, the proposed amendments remove the reference to subsection D of 9 VAC 25-260-185 and inserts new language stipulating that: 1) seasonal means should be calculated as geometric means; 2) the allowable exceedence frequencies of both sets of criteria and the length of the assessment period over which they should be evaluated; 3) the manner in which chlorophyll-*a* data should be aggregated and how segments should be subdivided for the purposes of data aggregation; and, 4) the reference to the EPA technical document that provides the boundaries of the James River segments.

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.

There are a number of advantages of the proposed amendments. First, DEQ will be able to better detect potentially harmful changes to the tidal James River stemming from excessive nitrogen and phosphorus loads that may affect the aquatic life designated use. DEQ will also be able to produce more confident assessments so that the public can be properly informed about the status of water quality in the tidal James River. Additionally, the proposed amendments strengthen the technical defensibility of the regulation so that the regulated community and resource managers can better understand the benefits expected to be gained with regulatory compliance. More defensible permit limits and non-point source management plans will result from the adoption of these amendments. A final benefit is that the costs needed to attain the proposed criteria may be less than what attainment of the existing criteria have been estimated to cost.

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

Requirements more restrictive than federal

Please identify and describe any requirement of the proposal which is more restrictive than applicable federal requirements. Include a rationale for the need for the more restrictive requirements. If there are no applicable federal requirements or no requirements that exceed applicable federal requirements, include a statement to that effect.

The proposed amendments do not exceed applicable federal minimum requirements.

Localities particularly affected

Please identify any locality particularly affected by the proposed regulation. Locality particularly affected means any locality which bears any identified disproportionate material impact which would not be experienced by other localities.

The 38 counties and 17 cities that will be particularly affected all drain into the James River: Counties: Albemarle, Alleghany, Amelia, Amherst, Appomattox, Augusta, Bath, Bedford, Botetourt, Buckingham, Campbell, Charles City, Chesterfield, Craig, Cumberland, Dinwiddie, Fluvanna, Giles, Goochland, Greene, Hanover, Henrico, Highland, Isle of Wight, James City, Louisa, Montgomery, Nelson, New Kent, Nottoway, Orange, Powhatan, Prince Edward, Prince George, Roanoke, Rockbridge, Surry, and York; Cities: Buena Vista, Charlottesville, Chesapeake, Colonial Heights, Covington, Hampton, Hopewell, Lexington, Lynchburg, Newport News, Norfolk, Petersburg, Portsmouth, Richmond, Suffolk, Williamsburg, and Virginia Beach.

Regulatory flexibility analysis

Pursuant to § 2.2-4007.1B of the Code of Virginia, 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.

Analysis not performed since no small businesses are affected.

Public participation

Please include a statement that in addition to any other comments on the regulation, the agency is seeking comments on the costs and benefits of the proposal, the potential impacts on the regulated community and the impacts of the regulation on farm or forest land preservation.

In addition to any other comments, the Board is seeking comments on the costs and benefits of the proposal, the potential impacts on the regulated community and on any impacts of the regulation on farm and forest land preservation. Also, the agency/board is seeking information on impacts on small businesses as defined in § 2.2-4007.1 of the Code of Virginia. Information may include 1) projected reported, recordkeeping and other administrative costs, 2) probable effect of the regulation on affected small businesses, and 3) description of less intrusive or costly alternative methods of achieving the purpose of the regulation.

Anyone wishing to submit written comments for the public comment file may do so by mail, email or fax to Tish Robertson, Office of Ecology, Department of Environmental Quality, P.O. Box 1105, Richmond, VA 23218, email: tish.robertson@deq.virginia.gov, phone: 804-698-4309, fax: 804-698-4116. Comments may also be submitted through the Public Forum feature of the Virginia Regulatory Town Hall web site at: www.townhall.virginia.gov. Written comments must include the name and address of the commenter. In order to be considered comments must be received by 5:00 p.m. on the date established as the close of the comment period.

A public hearing will be held following the publication of this stage and notice of the hearing will be posted on the Virginia Regulatory Town Hall website (<http://www.townhall.virginia.gov>) and on the Commonwealth Calendar website (<https://www.virginia.gov/connect/commonwealth-calendar>). Both oral and written comments may be submitted at that time.

A formal hearing will be held on a date and time and at a place to be determined if a request for a formal hearing is received by the contact person listed above within 30 days of publication of the notice of public comment period in the Virginia Register of Regulations.

Economic impact

Please identify the anticipated economic impact of the proposed new regulations or amendments to the existing regulation. When describing a particular economic impact, please specify which new requirement or change in requirement creates the anticipated economic impact.

Projected cost to the state to implement and enforce the proposed regulation, including: a) fund source / fund detail; and b) a delineation of one-time versus on-going expenditures	The projected cost to implement and enforce the proposed regulatory amendments should not cause any additional financial impact to the state. These amendments update existing rules, and while the staff may have to change the way water quality assessments are conducted, no additional staff or resources will be required to do this. The
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	assessment program is funded by EPA 106 grants as well as State general fund budget.
Projected cost of the new regulations or changes to existing regulations on localities.	The 36 significant municipal and industrial wastewater facilities that discharge nutrients into the James River basin may have financial impacts due to implementation of revised nutrient wasteload allocations under the proposed regulatory amendments. However, based on preliminary water quality modeling results, the affected dischargers may have lower projected costs to comply with the proposed amendments when compared to estimated treatment levels needed to meet the existing regulation. Using order-of-magnitude cost estimation procedures, up to \$172 million in capital costs may be incurred to upgrade these facilities with the technology needed to reduce nitrogen and phosphorus to the levels needed to achieve the proposed chlorophyll-a criteria. This is approximately 20% of the capital costs projected for compliance with the existing regulation, the stringency of which necessitates the treatment of wastewater nearing the limit of technology at every facility. Up to \$27 million in additional annual operation and maintenance costs may be incurred. This is half the operation and maintenance costs projected for compliance with the existing regulation. The preliminary modeling results will be reviewed and revised as necessary upon completion of further modeling work. Simulations of more refined point source nutrient reduction scenarios are being processed to test compliance with the proposed chlorophyll criteria and to estimate the potential impact on the dischargers and their nutrient waste load allocations for total nitrogen and total phosphorus.
Description of the individuals, businesses, or other entities likely to be affected by the new regulations or changes to existing regulations.	Individuals, businesses, or other entities potentially impacted include point source permitted discharges; Publicly Owned Treatment Works treating domestic wastewater greater than 0.5 million gallons per day (MGD) with nitrogen and phosphorus in their discharge, and industrial facilities discharging an equivalent annual load of nutrients. This includes municipal sewage treatment plants, food processing (poultry and seafood), chemical and pulp and paper industries.
Agency's best estimate of the number of such entities that will be affected. Please include an estimate of the number of small businesses affected. Small business means a business entity, including its affiliates, that: a) is independently owned and operated and; b) employs fewer than 500 full-time employees or has gross annual sales of less than \$6 million.	25 significant municipal sewage/wastewater treatment plants 11 significant industrial dischargers 0 small businesses
All projected costs of the new regulations or changes to existing regulations for affected	Compliance with the proposed chlorophyll-a criteria may necessitate up to \$172 million in

<p>individuals, businesses, or other entities. Please be specific and include all costs including:</p> <p>a) the projected reporting, recordkeeping, and other administrative costs required for compliance by small businesses; and</p> <p>b) specify any costs related to the development of real estate for commercial or residential purposes that are a consequence of the proposed regulatory changes or new regulations.</p>	<p>capital costs and up to \$27 million in additional operation and maintenance costs for 25 significant municipal wastewater treatment plants. This is approximately 20% of the capital costs and 50% of the operation and maintenance costs projected for compliance with the existing regulation, the stringency of which necessitates the treatment of wastewater nearing the limit of technology at all affected dischargers.</p> <p>The 11 significant industrial dischargers that would be affected may incur up to a \$52 million in capital costs and up to \$3 million in additional operation and maintenance costs. These projected costs are approximately 50% of the costs projected for the existing regulation.</p> <p>These point source cost estimates represent order-of-magnitude planning cost estimates (-30% to +50%). More accurate costs can only be derived through specific facility planning, design and ultimately construction bids for the treatment upgrades. It is not expected that the amendments will affect reporting, recordkeeping, or other administrative costs.</p>
<p>Beneficial impact the regulation is designed to produce.</p>	<p>The proposed amendments makes the regulation more scientifically defensible, easier to implement, and will result in more confident assessment results.</p>

Alternatives

Please describe any viable alternatives to the proposal considered and the rationale used by the agency to select the least burdensome or intrusive alternative that meets the essential purpose of the action. Also, include discussion of less intrusive or less costly alternatives for small businesses, as defined in § 2.2-4007.1 of the Code of Virginia, of achieving the purpose of the regulation.

There were two alternatives considered by DEQ staff and discussed with the regulatory advisory panel:

- Whether a three-year or six-year water quality monitoring data period should be used to conduct assessments of the chlorophyll-a criteria. As with Chesapeake Bay dissolved oxygen and submerged aquatic vegetation assessments, the existing chlorophyll-a criteria are evaluated over a three-year period. With a three-year period, only one exceedence of either of the seasonal mean criteria would be allowed in a segment. Toxic parameters like ammonia are assessed with a similar rule. The advantage of a shorter period is that impairment can be detected more rapidly. However, DEQ staff decided that a six-year assessment period would enable more confident assessments since a wider range of conditions would be observed. This additional confidence also extends to the assessment of water quality modeling results. Moreover, since chlorophyll-a 1) is not a toxic pollutant, 2) is not a direct stressor of aquatic life, and 3) can be sporadically elevated for reasons unrelated to human activity, DEQ staff believe that a shorter period may be overly restrictive. DEQ uses a six-year water quality monitoring data period for assessments of most conventional pollutants in most of the surface waters of the Commonwealth. A disadvantage of a six-year assessment period is that two consecutive seasonal mean criteria

exceedences would be allowed. Concerns were expressed by a RAP member that this could have implications on aquatic life recovery.

- Whether chlorophyll-a criteria should be expressed as only seasonal means or as seasonal means and shorter-term, upper threshold values not to be exceeded more than 10% of the time. The proposed seasonal mean criteria were developed to protect against the long-term and short-term harmful effects of algae on aquatic life, so it can be argued that additional criteria are not needed. However, DEQ staff decided that incorporating both sets of criteria would limit the magnitude of seasonal mean exceedences and further minimize the frequency of potentially harmful algae blooms. DEQ staff also decided that the short-duration criteria would minimize any harmful effects resulting from consecutive seasonal mean exceedences, since the magnitude of seasonal mean exceedences are constrained when the short-duration criteria are attained.

Regulatory flexibility analysis

Pursuant to § 2.2-4007.1B of the Code of Virginia, 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.

Dischargers that are not able to meet the permit limits resulting from the proposed amendments may request a compliance schedule or a water quality standards variance.

Public comment

Please summarize all comments received during the public comment period following the publication of the NOIRA, and provide the agency response.

Commenter	Comment	Agency response
Virginia Manufacturers Association (VMA)	Request to be represented on the regulatory advisory panel	VMA is represented on the regulatory advisory panel
Virginia Association of Municipal Waterwater Agencies, Inc. (VAMWA)	Request to be represented on the technical advisory panel	VAMWA is represented on both the scientific and regulatory advisory panels.
Chesapeake Bay Foundation (CBF)	Request to be represented on the regulatory advisory panel. DEQ should more clearly define the roles of the scientific advisory panel (SAP) and regulatory advisory panel. DEQ should	CBF is represented on the regulatory advisory panel. The scientific advisory panel focused solely on the technical concerns of the criteria, whereas the regulatory advisory panel discussed both technical and policy concerns, including economic impacts. DEQ

	commit to submitting the key work of the SAP to the Chesapeake Bay Program's Scientific and Technical Advisory Committee (STAC).	submitted the SAP's final report to STAC for peer review, and subsequently submitted the agency's proposal as well.
James River Association (JRA)	Request to be represented on the regulatory advisory panel. DEQ should expand the scope of the James River chlorophyll-a study to determine linkages between chlorophyll-a and human health/ aquatic health impacts and chlorophyll-a and bacteria, clarity, and toxicity. The study plan should include additional monitoring sites and phytoplankton sampling (of toxin and non-toxin producing species). There should also be a greater role for EPA on the scientific advisory panel. DEQ should commit to submitting the key work of the SAP to the Chesapeake Bay Program's Scientific and Technical Advisory Committee (STAC).	JRA is represented on the regulatory advisory panel. The James River Chlorophyll-a Study explored most of the linkages the commenter mentioned (aquatic life health, clarity, and toxicity). Human health impacts were not explored since the levels of potentially toxic algae found in the tidal James are not generally high enough to be of concern to human health. However, microcystin levels in James River blue crabs were analyzed by DEQ staff and assessed in the context of human health. The risk to human health was found to be low. Linkages between chlorophyll-a and bacteria were not explored since bacteria loads are not necessarily tied to nutrient enrichment. Monitoring efforts were expanded considerably during the course of the study, with significant attention placed on phytoplankton and algal toxin sampling. The EPA-Chesapeake Bay Program Office is represented on both the scientific and regulatory advisory panels. DEQ submitted the SAP's final report to STAC for peer review, and subsequently submitted the agency's proposal as well.

Family impact

Please assess the impact of this 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 proposed regulatory action may decrease the disposable family income as localities and industrial dischargers upgrade their treatment facilities and pass the increased water and sewer costs to ratepayers and consumers.

Detail of changes

Please list all changes that are being proposed and the consequences of the proposed changes; explain the new requirements and what they mean rather than merely quoting the proposed text of the regulation.

If the proposed regulation is a new chapter, describe the intent of the language and the expected impact. Please describe the difference between existing regulation(s) and/or agency practice(s) and what is being proposed in this regulatory action. If the proposed regulation is intended to replace an emergency regulation, please follow the instructions in the text following the three chart templates below.

For changes to existing regulation(s), please use the following chart:

Current section number	Proposed new section number, if applicable	Current requirement	Proposed change, intent, rationale, and likely impact of proposed requirements
9VAC 25-260-310		Contains site-specific and effluent criteria for various water bodies	Deletes reference to subsection D of 9 VAC25-260-180 and adds reference to the EPA document that describes the Chesapeake Bay segment boundaries. Adds language stipulating how chlorophyll-a data should be aggregated in time and space. Modifies seasonal mean criteria, lowering eight and raising two. Inserts new table of criteria that apply only during summer. Provides the allowable exceedence frequencies and assessment periods for both sets of criteria.