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Nutrient Credit Trading Ratio Study Report

Submitted to the State Water Control Board by the Department of Environmental Quality

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I. Introduction

Provisions of the Chesapeake Bay Watershed General Permit require that new or expanding point sources acquire allocations or credits to offset the entirety of their nutrient load (9VAC25-820-70). The permit regulation allows for the offsets to include certified nutrient credits “[s]ubject to a trading ratio of two pounds reduced for every pound to be discharged.”

An enactment clause in Senate Bill 77 (2012) and House Bill 176 (2012) requires “[t]hat by July 1, 2013, the State Water Control Board shall reevaluate its trading ratio for nutrient allocation acquisition pursuant to subdivision B 1 b of § 62.1-44.19:15 of the Code of Virginia, giving full consideration to similar trading ratios established by § 10.1-603.8:1¹ of the Code of Virginia, §10.1-603.15:2² as added by this act, and trading programs in other Chesapeake Bay watershed states. The Board shall establish an advisory group of interested stakeholders for the purpose of receiving recommendations during the reevaluation regarding an appropriate ratio. If warranted based on the outcome of the reevaluation, the Board shall adopt a revised trading ratio for purposes of subdivision B 1 b of § 62.1-44.19:15 as soon as practicable following the completion of the reevaluation.”

¹ As a result of the 2013 legislation consolidating water quality programs, effective July 1, 2013, these provisions will be set forth at Va. Code § 62.1-44.15:35. Therefore, any reference to Va. Code § 10.1-603.8:1 throughout this report is now Va. Code § 62.1-44.15:35.

² As a result of the 2013 legislation consolidating water quality programs, effective July 1, 2013, these provisions are set forth at Va. Code § 62.1-44.19:20. Therefore, any reference to Va. Code § 10.1-603.8:1 through this report is now Va. Code § 62.1-44.19:20.

Concerns have been expressed by the wastewater industry regarding the implications of the current ratio requirement. These concerns relate to the supply of credits that may be available and the implications for the cost of acquiring credits to offset loads. There is also concern about the difficulty in maintaining nutrient caps in the face of an expanding population and economy should offsets, in the number required under the permit, be scarce. The industry has also noted the differences between Virginia's requirement and the trading ratios in place in other Chesapeake Bay Watershed states.

As directed by the General Assembly, the Department of Environmental Quality (DEQ) assembled a stakeholder committee to advise the agency on this issue. The roster of members of the study committee is attached as Appendix 1. Please note that membership on the committee does not necessarily imply endorsement of the recommendations contained in this report. The committee served to advise the agency on the issues raised in the enactment clause, not necessarily endorse any final recommendations by DEQ or the State Water Control Board.

All materials and documents related to the study are posted on DEQ's website at: <http://www.deq.virginia.gov/Programs/Water/PermittingCompliance/PollutionDischargeElimination/NutrientTrading/TradingRatioStudy.aspx>

II. Trading Ratios

Nationally, trading ratios are a familiar feature of nutrient trading programs and vary from program to program (Robaudo and Gottlieb, 2011). The purposes range from dealing with inherent uncertainties in the efficiencies of certain nonpoint source management practices to accounting for the physiographic location of the practice to the separation of the practice from the discharge to water and other factors. In some programs, these factors are combined in a manner that effectively establishes a trading ratio, although the terminology may vary from program to program (Vogel and Szeptycki, 2012). Ratios of 2 to 1 or 3 to 1 or greater between nonpoint and point sources are not uncommon, however in programs in the Chesapeake Bay Watershed, 1.1 to 1 to 1.2 to 1 ratios exist. Although in many of these programs, trades with these smaller "uncertainty" ratios are discounted by the application of credit retirement requirements, delivery ratios or other factors.

Specific ratios for Chesapeake Bay watershed states are summarized in Part III of this report.

Current Virginia Law

In Virginia, nutrient credit trading ratios are established in both law and regulation. Provisions of the Chesapeake Bay Watershed General Permit require that new or expanding point sources acquire allocations or credits to offset the entirety of their nutrient load (9VAC25-820-70). A provision of the permit regulation allows for the offsets to include certified nonpoint source credits "[s]ubject to a trading ratio of two pounds reduced for every pound to be discharged." Based on projections of nutrient loads from the wastewater sector, the need to offset loads with nonpoint source credits from new or expanding facilities may be some years away. As a result, this provision has not yet been used.

Other provisions of Virginia law also address trading ratios. The Code of Virginia establishes a 1 to 1 ratio for nonpoint to nonpoint source trading under the provisions of [§10.1-603.8:1](#). Relating to credits used to meet post-construction stormwater nutrient requirements. This ratio is established between nonpoint source credits and nonpoint source post-construction phosphorus loading requirements. Credits used for this purpose must be certified as “perpetual” and have, with one exception, involved conversion of land from agricultural uses to forest with permanent protection through an easement or some other instrument attached to the deed. Nonpoint source credits used to offset point source discharges are not required to be perpetual.

Section [62.1-44.19:15 D](#). of the Code of Virginia also specifies that documented credits derived from animal waste-to-energy facilities shall not be subject to a 2 to 1 trading ratio. To date, no credits have been certified from animal waste-to-energy facilities, so this provision of the Code has not been exercised.

A new provision of law that will be implemented following the development of regulations, calls for the permanent retirement of 5% of certified nonpoint source credits. *See* Va. Code § 10.1-603.15:2(B)(8). It should be noted that retirement requirements are intended to achieve a net water quality improvement benefit, while the uncertainty trading ratio is intended to address the difference in certainty of performance between point and nonpoint source control practices and technologies. The Code of Virginia makes this distinction in the Nutrient Credit Trading Act which reads: “The regulations adopted pursuant to this section shall... (e) establish a credit retirement requirement whereby five percent of credits in the Chesapeake Bay Watershed are permanently retired at the time of certification pursuant to this section for the purposes of offsetting growth in unregulated nutrient loads.” (Va. Code 10.1-603.15:2 B.8)

III. Chesapeake Bay Basin States’ Ratios

West Virginia

West Virginia has developed policy and guidance related to nutrient trading in the Potomac River watershed but does not yet have an operating nutrient credit trading program. Guidance developed by the West Virginia Department of Environmental Protection called for a series of ratios that will be applied to any trade. The base ratio in West Virginia for NDPES permittees is 1.2 to 1. However, program guidance allows for a greater uncertainty ratio for some practices that “are not measured or have not been peer reviewed and approved by the Chesapeake Bay Program.” (West Virginia DEP)

The factors include an uncertainty ratio (applied only to nonpoint source to point source trades), and a “special concerns” ratio that may be applied to credits generated in watersheds deemed to have special water quality concerns. (West Virginia DEP, 2010). West Virginia does not specify a specific ratio for each trade. Rather, the ratio will vary for each approved use of credits, depending on the factors applied.

Maryland

Maryland does not have an uncertainty ratio for approved practices. However, an uncertainty ratio may be applied to certain categories of Best Management Practices (BMPs) specified in the program guidance. The categories include BMPs that are currently in use in the Chesapeake Bay watershed but may still require additional scientific analysis and technical review or new technologies that are not yet widely used.

It should be noted that Maryland's use of nutrient credits is confined to offsetting an increase in loads from point or nonpoint source permitted activities. Credits are not available to meet any permit compliance obligations, so with the exception of an increased nutrient allocation provided to a sewage treatment plant which made connections from on-site systems, there have been no trades in Maryland involving nonpoint source generated credits.

As in West Virginia, there is no set ratio for each trade; rather ratios vary depending on the site specific circumstances of each generated credit. (Maryland, 2008)

Pennsylvania

Pennsylvania employs two ratios that reduce the credits available for sale, delivery and edge of segment. These ratios are dependent upon the nature and location of the proposed credit-generating activity. The Pennsylvania Department of Environmental Protection (DEP) also sets aside 10% of every credit traded in a reserve. The Pennsylvania DEP also reserves the right to modify calculation procedures to account for uncertainty or other factors in the interest of water quality protection.

Based on an EPA review and the ongoing evolution of Pennsylvania's trading program, the Pennsylvania DEP has committed to review and enhance its current program to address concerns made by EPA, the Chesapeake Bay Foundation, and other stakeholders by September 30, 2015. The enhancements implemented by September 30, 2015 will be the first step in the enhancement of Pennsylvania's trading program, with the second step being implemented by September 30, 2017 or after the new Phase 6 Chesapeake Bay Model is implemented, whichever is later.

Other Chesapeake Bay Jurisdictions

The remaining Chesapeake Bay states, Delaware and New York, have not yet developed trading programs. The District of Columbia is currently developing a "Stormwater Retention Credit Trading program" to allow additional flexibility in meeting new stormwater regulations; however its provisions are still under development and may or may not be relevant to the issues addressed in this report.

A Note about Delivery Factors:

Due to the natural attenuation of nutrients as they travel downstream, each state program in the Chesapeake Bay watershed applies a "delivery" factor to the credits generated depending on their proximity to the Chesapeake Bay based on versions of the Chesapeake Bay Program

watershed model. Nutrient credits are discounted to account for this natural process in upstream regions and less so if the practice is closer to tidal waters. Currently, in Virginia, the delivery factor is applied depending on whether the location of the proposed practice is in, above, or below the fall line and the trading ratio follows the final results of the calculation should the credits be used to offset new or expanding point source loads. The current delivery factors are based on an older version of the Chesapeake Bay Program model and will change as a result of the current nutrient credit certification rulemaking.

IV. Uncertainty in Practice Performance

The ratio required for the use of credits to offset the loads of new or expanding facilities in Virginia is based on an “uncertainty” factor. It is well understood that the nutrients discharged from a wastewater treatment plant are easier to quantify based on monitoring and sampling. The efficiencies of many stormwater or agriculture practices are inherently uncertain and are affected by numerous factors including operation and maintenance, soil and slopes, proximity to water bodies, and weather (NAS 2011). Because of these variations, the National Academy of Sciences reports “BMP efficiencies are often derived from limited research or small-scale, intensive, field-monitoring studies in which they may perform better than they would in aggregate in larger applications, particularly at the watershed scale” (NAS 2011).

To some degree, these inherent uncertainties are addressed in the comprehensive evaluation of BMP efficiencies conducted for the Chesapeake Bay Program (NAS, 2011, p. 74). However, the NAS recommended continued attention to this issue and periodic revisions to BMP efficiencies based on new research and information. The comprehensive analysis undertaken on behalf of the Chesapeake Bay Program clearly recognized these uncertainties and attempted to offer “conservative” efficiencies (Simpson and Weammert, 2009). The Chesapeake Bay Program analysis recognized the limitations of current literature and the necessity, in some cases, of using professional experience and judgment to establish practice efficiencies (Simpson and Weammert, 2009). The consensus of the literature on this issue is that precise certainty regarding the performance of BMPs is not possible.

In his presentation to the stakeholder committee, Dr. Simpson of Water Stewardship, Inc. noted the following general rules regarding uncertainty in the assignment of efficiencies to nonpoint source practices. He noted that there are wide variations in the amount of research and data for BMPs and a wide variation in reported efficiencies for the same BMP. He recognized that uncertainty remains for even those BMPs with the most data because the research techniques used might be from only one hydrologic or geomorphic setting. Data is also collected at the plot or transect level rather than at a watershed scale and therefore his conclusion was that even the knowledge base for the “most certain” BMPs have “substantial uncertainty.” (Simpson, 2013)

Related to the issue of uncertainty is the ongoing verification that a practice is in place and being maintained. Verifying the existence and the operation and maintenance of any particular practice is important to understand the overall reductions that might be expected over its useful service life (Simpson and Weammert, 2009) (Dubin, 2013). Unless practices are verified in some fashion, it is difficult to confirm whether presumed reductions of nutrients are taking place.

V. Current Regulatory and Administrative Actions

There is a great deal of activity at the state and regional levels related to nutrient credits, their certification and use, that may influence the design and requirements of Virginia's nutrient credit trading programs.

Amendments to the Chesapeake Bay Watershed General Permit

Based on revisions to the State Water Control Law by the General Assembly in 2012, new or expanding point source facilities have an array of methods to offset their nutrient loads. Prior to the 2012 changes, facilities could acquire allocations from other point source facilities, from nonpoint sources or from the Water Quality Improvement Fund. New or expanding facilities may now acquire allocations or credits from other point sources or credits certified under the new regulations discussed below. This offers considerable additional flexibility for new or expanding facilities to offset their nutrient loads.

DEQ is also beginning the reissuance process for the watershed general permit which expires on December 31, 2016. Any consideration of revised trading ratios could be addressed with the permit reissuance rather than a separate rulemaking process.

EPA Technical Memorandum

EPA Region III has developed a series of Technical Memoranda related to trading and offset credit issues. A memorandum addressing trading ratios (Accounting for Uncertainty in Offset and Trading Programs) was issued on February 12, 2014. Although they are not considered official agency guidance, the Technical Memoranda do reflect the agencies expectations for nutrient trading programs under the Chesapeake Bay Total Maximum Daily Load (TMDL).

The EPA memorandum establishes an expectation for an uncertainty ratio of at least 2:1 with two possible exceptions:

1. An uncertainty ratio as low as 1:1 may be appropriate when direct and representative monitoring of a nonpoint source is performed at a level similar to that performed at traditional NPDES point sources and there is consistency in operation of the nonpoint source.
2. A ratio of less than 2:1 may be appropriate for projects involving implementation of BMPs for land conservation that ensures permanent protection through a conservation easement or other instrument attached to the deed and where load reductions can be reliably determined.

Virginia Nutrient Credit Certification Regulations

“The Nutrient Trading Act”, passed in the 2012 session of the General Assembly required the promulgation of regulations to certify nutrient credits from nonpoint source practices. The rulemaking process has begun and regulations are currently being drafted for board review and adoption. The results of this rulemaking will result in the establishment of baseline practices (practices that must be in place before credits can be generated), calculation procedures, verification requirements, reporting, and operation and maintenance, among others. An overview of the rulemaking process and related materials are currently available at: <http://townhall.virginia.gov/L/ViewAction.cfm?actionid=3760>

Chesapeake Bay Program BMP Verification Committee

Based on the recommendations contained in the National Academy of Sciences Report, the EPA’s Chesapeake Bay Program assembled a committee to recommend standards for verification of BMPs by the Chesapeake Bay jurisdictions. The resulting Chesapeake Bay Program Partnership’s BMP Verification Principles was adopted by the Partnership’s Principals’ Staff Committee on December 5, 2012. A copy of the report and other information regarding the committee’s work is available at: http://www.chesapeakebay.net/groups/group/best_management_practices_bmp_verification_committee

VI. Agency Recommendation

Based on the research done for this report, discussion with stakeholders and the February 12, 2014 EPA Technical Memorandum, DEQ recommends that there should be no separate rulemaking at this time to address the current 2 to 1 trading ratio. With the proposed rulemaking to reissue the Watershed General Permit, DEQ will be receiving additional comments on the 2:1 trading ratio and will be in position to make any adjustments to account for the two exceptions included in the EPA Technical Memorandum. We acknowledge the concerns of the wastewater industry and we recognize that Virginia’s required ratio is greater than those of some of our neighboring states. We would note that at least one state, Pennsylvania, has committed to review and possibly change their current ratio to conform with EPA’s expectations in the Technical Memorandum.

Bibliography

Mark Dubin, Presentation to Trading Ratio Study Committee “Verifying the Effectiveness of Agricultural Best Management Practices”; available at:

<http://www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/MarkDubinVATradingRatioStudy-2013-01-08.pdf>

Maryland Department of the Environment, Policy for Nutrient Cap and Trading, 2008

<http://www.mde.maryland.gov/programs/water/pages/water/nutrientcap.aspx>

Maryland Department of Agriculture “Producing and Selling Credits in Maryland's Nutrient Trading Market: Guidance for Agricultural Producers and Landowners in the Chesapeake Bay Watershed”; available at <http://www.mdnutrienttrading.com/>

National Research Council, Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay: An Evaluation of Program Strategies and Implementation, Committee on the Evaluation of Chesapeake Bay Program Implementation for Nutrient Reduction to Improve Water Quality, 2011

Commonwealth of Pennsylvania Code § 96.8. Use of offsets and tradable credits from pollution reduction activities in the Chesapeake Bay Watershed; available at:

<http://www.pacode.com/secure/data/025/chapter96/s96.8.html>

Commonwealth of Pennsylvania, Department of Environmental Protection, Nutrient Trading Program; <http://www.dep.state.pa.us/river/nutrienttrading/calculations/index.htm>

<http://www.pabulletin.com/secure/data/vol40/40-41/1927.html>

Commonwealth of Pennsylvania Department of Environmental Protection Presentation to the Chesapeake Bay Program, December 19, 2012

http://www.chesapeakebay.net/channel_files/19062/program_enhancement_overview_towg.pdf

Marc O. Ribaud and Jessica Gottlieb, Point-Nonpoint Trading – Can it Work? Journal of the American Water Resources Association, February 2011.

Dr. Thomas Simpson and Sarah Weammert, Developing Best Management Practices Definitions and Effectives Estimates for Nitrogen, Phosphorus and Sediment in the Chesapeake Bay Watershed - Final Report, University of Maryland Mid-Atlantic Water Program. December 2009

Dr. Thomas Simpson, Perspectives on Agricultural Best Management Practice Effectiveness and Verification, Presentation, 1/8/2013; available at:

<http://www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/SimpsonVATradingRatioPanel-2013-01-08.pdf>

United States Environmental Protection Agency, Accounting for Uncertainty in Offset and Trading Programs, EPA Technical Memorandum, February 12, 2014; available at:

http://www.epa.gov/reg3wapd/pdf/pdf_chesbay/TradingTMs/Final_Uncertainty_TM_2-12-14.pdf

Commonwealth of Virginia, Department of Environmental Quality, VPDES Watershed General Permit for Nutrient Discharges to the Chesapeake Bay, available at:
<http://www.deq.virginia.gov/Programs/Water/PermittingCompliance/PollutionDischargeElimination/NutrientTrading.aspx>

Commonwealth of Virginia, Department of Environmental Quality, Trading Nutrient Reductions from Nonpoint Source Best Management Practices in the Chesapeake Bay Watershed: guidance for Agricultural Landowners and Your Potential Trading Partners, available at:
http://www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/VANPSTradingManual_2-5-08.pdf

Commonwealth of Virginia, Acts of Assembly, 2012, Chapter 808 available at:
<http://leg1.state.va.us/cgi-bin/legp504.exe?121+ful+CHAP0808+pdf>

Jennifer Vogel and Leon F. Szeptycki, A Survey of Trading Ratios used for Generation of Credits in Water Quality Trading Programs, Environmental Law and Conservation Clinic, University of Virginia School of Law, July 20, 2012

West Virginia Water Quality Nutrient Credit Trading Program Guidance – West Virginia Department of Environmental Protection, available at:
<http://wwri.nrcce.wvu.edu/programs/pwqb/index.cfm>

APPENDIX I

Chesapeake Bay Watershed General Permit – Trading Ratio Study Stakeholder Committee Established October 2012 by the Department of Environmental Quality

Regulated Community

Chris Pomeroy, VAMWA
Jim Pletl, HRSD

Local Government

Fran Geissler, James City County (Alternate: Whitney Katchmark, Hampton Roads Planning District Commission)

Conservation Organizations

Nicole Rovner, The Nature Conservancy
Jeff Kelble, Shenandoah River Keeper
Ann Jennings, Chesapeake Bay Foundation
Jacob Powell, Virginia Conservation Network/Choose Clean Water Coalition

Agricultural Organizations

Wilmer Stoneman, Virginia Farm Bureau

Consultants

Joe Maroon, Maroon Consulting
Kevin Seaford, Golder Associates
Peter Brooks, PMBA Environmental Services
Tom Simpson, Water Stewardship
Brent Fults, Chesapeake Bay Nutrient Land Trust

Government

Jack Frye, Chesapeake Bay Commission

DEQ/DCR

Russ Baxter
Allan Brockenbrough
Stephanie Martin
Scott Crafton (Ginny Snead)