



Virginia Department of Planning and Budget **Economic Impact Analysis**

9 VAC 25-260 Water Quality Standards
Department of Environmental Quality
May 23, 2014

Summary of the Proposed Amendments to Regulation

Federal and state mandates in the Clean Water Act at 303(c), 40 CFR 131 and the Code of Virginia in §62.1-44.15(3a) require that water quality standards be adopted, modified or cancelled every three years. Consequently, the State Water Control Board (Board) proposes numerous changes to the Water Quality Standards (9 VAC 25-260). Proposed amendments that potentially have economic impact include the following: 1) more stringent ammonia limits for municipal dischargers to comply with revised ammonia criteria, 2) more stringent cadmium criteria for the protection of freshwater aquatic life, 3) more stringent lead criteria, 4) updating eight human health criteria parameters, 5) reclassifying 24 waters from Class III (non-tidal free flowing waters) to Class VII (swamp waters), 6) adding site specific maximum temperature criteria for four trout-stocked waters, and 7) deleting the manganese criterion for public water supplies.

Result of Analysis

The benefits will clearly exceed costs for some proposed changes. .

Estimated Economic Impact

The Water Quality Standards (9 VAC 25 260) are used in setting Virginia Pollutant Discharge Elimination System Permit limits and for evaluating the waters of the Commonwealth for inclusion in the Clean Water Act 305(b) water quality characterization report and on the 303(d) list of impaired waters. Waters not meeting standards require development of a Total Maximum Daily Load (TMDL) under the Clean Water Act at 303(e). The Board's proposed

amendments are designed to enable Virginia to comply with the Clean Water Act and to reduce unnecessary costs when possible.

Several of the proposed changes will be beneficial by creating better water quality in the Commonwealth for recreation, consumption of fish and shellfish, and protection of aquatic life, as well as human health. Other proposed changes will be beneficial by lowering costs for affected facilities. The proposed increase in criteria stringencies will increase costs for some facilities.

The primary and most widespread potential cost increase associated with the proposed amendments would be from meeting more stringent ammonia limits for municipal dischargers to comply with revised ammonia criteria. The facilities most likely to be affected are those in the Chesapeake Bay watershed with design flows less than 0.1 million gallons/day (MGD) located east of Interstate 95 and those with design flows less than 0.5 MGD west of I-95. Permittees with discharges outside of the Bay watershed, particularly those facilities that are large in volume compared to the receiving stream, may also have similar potential for financial impacts.

Ammonia Chesapeake Bay Facilities

There are approximately 220 discharge permits issued in the Chesapeake Bay watershed with either ammonia limits or ammonia monitoring requirements. Although ammonia limits or monitoring requirements are in the permits, it may be assumed those facilities with ammonia limits east of Interstate 95 with a design flow equal to or greater than 0.1 MGD and those with ammonia limits west of I-95 with a design flow equal to or greater than 0.5 MGD either currently have requirements or will be required to nitrify/denitrify to comply with the Water Quality Planning Management Regulation (9VAC25-720 et seq) and the Chesapeake Bay Total Maximum Daily Load Watershed Implementation Plan. Those facilities utilizing a nitrification/denitrification wastewater treatment process to meet total nitrogen concentration limits greatly reduce the ammonia concentrations in effluent to very low levels and consequently will most likely meet the more stringent ammonia criteria without additional effort.

There are approximately 20 facilities east of Interstate 95 with flows less than 0.1 MGD. It is anticipated that these facilities have the greatest likelihood to incur impacts due to more stringent ammonia criteria. Of these, 17 now have numeric ammonia limits and it is likely they

have nitrification capability to meet current limits; however an upgrade and/or operational procedure modification may be necessary to comply with newer, more stringent ammonia limits.

There are approximately 119 facilities west of I-95 with design flows less than 0.5 MGD. It is anticipated that these facilities have the greatest likelihood to incur impacts due to more stringent ammonia criteria. All but 2 have numeric ammonia limits now and it is likely that the facilities with numeric limits have nitrification capability to meet current limits; however an upgrade and/or operational procedure modification may be necessary to comply with newer, more stringent ammonia limits. It is not known how many of these would install a simple nitrification system or an advanced nitrification/denitrification system.

Ammonia Non-Bay Facilities

There are approximately 150 discharge permits issued outside of the Chesapeake Bay watershed with either ammonia limits or ammonia monitoring requirements. It appears likely that those with only monitoring requirements will incur costs should more stringent effluent limits be necessary. All but 8 have numeric ammonia limits now and it is likely these facilities have nitrification capability to meet current limits; however an upgrade and/or operational procedure modification may be necessary to comply with newer, more stringent ammonia limits.

Costs Associated with Meeting Ammonia Criteria

A simple nitrification system costs about \$372,000 for a 0.10 million gallon/day (MGD) sewage treatment plant. The cost of an advanced treatment system capable of both nitrification and denitrification (nitrogen removal) can range from \$750,000 to \$8,195,000 depending on the current level of treatment and volume of discharge. These costs are one-time capital expenditures and are unlikely to recur during the useful life of the equipment; however, operations and maintenance costs would be ongoing. Operations and maintenance for nitrification/denitrification could be \$23,000 for a 0.10-MGD plant to \$195,000 for a 0.60-MGD plant.

For a totally new 0.7 MGD plant, roughly 50% of the cost of the new oxidation ditch, and 100% of the submerged diffused outfall, etc., is attributed toward the cost for ammonia removal. In this case, roughly 9% of the total cost can be attributed to ammonia removal or roughly \$500,000 of the \$5,655,000 bid price.

A volume upgrade from 4.0 to 6.5 MGD, the cost attributable to ammonia removal is more complicated because the oxidation ditch volume is set, with no expansion of the aerator volume, but there is a hydraulic increase of the overall facility. Roughly 30% of the aeration system, filter, and digester upgrade costs, and 100% of the IFAS costs are attributable to ammonia removal. This adds up to about \$1,720,700 or roughly 13% of the overall bid price of \$13,278,600. It is estimated the cost per gallon of ammonia removal in the examples given above for the new construction is \$0.71/gallon and cost per gallon for the upgrade is \$0.26/gallon.

Cadmium

The Board proposes to amend the cadmium criteria for the protection of freshwater aquatic life to be approximately 50 percent more stringent than the current requirement but not as stringent as the United States Environmental Protection Agency's (EPA's) 2011 recommendation. There are a total of 24 active discharge permits with either numeric cadmium limits or monitoring requirements. Of these, 13 have monitoring requirements only. Monitoring requirements without discharge limits typically result from a permit review using a "Reasonable Potential Analysis" that indicates the facility may have a particular parameter in its effluent, ergo the monitoring requirement. The monitoring data is used in subsequent permit reissuances to determine if discharge limits should be included. Given that the cadmium freshwater criteria are becoming more stringent it is assumed facilities with only monitoring requirements may be the most likely to be affected.

Lead

The Board proposes to include a conversion factor for lead criteria to be consistent with other Virginia aquatic life criteria for metals to allow for the criteria to be expressed as the dissolved fraction of the metal. This change would make the criteria more stringent by approximately 5 through 22 percent. There are a total of 26 active permits with either numeric lead limits or monitoring requirements. Of these, 14 have monitoring requirements only. Amending the freshwater lead criteria will change the parameter to be expressed as the dissolved portion of lead (current expression is total recoverable). Significant impacts to dischargers are not anticipated as permit limits for lead are calculated using the total recoverable form.

Amendments to Parameters for the Protection of Human Health

The Board proposes to update eight human health criteria parameters which would increase the concentrations for carbon tetrachloride, methylene chloride, nitrobenzene and tetrachloroethylene between 88 and 1779 percent. In contrast, the changes for cyanide, hexachloroethane, pentachlorophenol, and trichloroethylene would decrease between 64 and 97 percent. The cost savings from the less stringent criteria would likely approximately equal the cost increases from the more stringent criteria. In balance, the proposed change in criteria re expected to more protective of human health without significantly increasing cost.

Reclassifying Waters from Class III to Class VII

The Board proposes to reclassify 24 waters from Class III (non-tidal free flowing waters) to the more appropriate Class VII (swamp waters). This will potentially save approximately \$18,000 each, in that Class III would inappropriately require a pH or TMDL study. In aggregate, this proposed change would produce approximately \$432,000¹ in savings.

Trout and Water Temperature

All waters classed as ‘Stockable Trout Waters’ (Class V) have a year-round maximum temperature criterion of 21°C. The Department of Game and Inland Fisheries stocks trout during the winter in some warm-water rivers and streams. Given the naturally occurring temperatures of these warm-water rivers and streams, trout are not expected to survive the following summer. Application of 21°C maximum temperature year-round is inappropriate and does not reflect the natural thermal regime of these waters during the warmer seasons.

Thus the Board proposes to add site specific maximum temperature criteria that apply during warm months: May 1 – October 31. There are four waters to which this applies. This will enable facilities to avoid having to obtain unnecessary TMDLs, producing at least \$72,000 in savings.

Manganese

Deletion of the manganese criterion for public water supplies could have a similar impact in the form of cost savings due to unnecessary TMDL studies not being done.

¹ \$18,000 x 24 = \$432,000

Businesses and Entities Affected

The proposed amendments particularly affect municipal wastewater facilities and sewage treatment plants, and industrial plants that discharge to surface waters of the Commonwealth. The estimated number of potentially affected facilities due to proposed amendments to the ammonia, lead, cadmium, and human health criteria is 435 and includes those facilities with effluent limitations and those with monitoring requirements but no limits.

There are approximately 352 active Virginia Pollutant Discharge Elimination System (VPDES) permits with effluent limitations for ammonia. A significant number of those facilities may receive more stringent ammonia limits, as well as the potential for new facilities to receive limits, as the proposed water quality criteria are implemented. Significant Dischargers of nutrients (POTWs ≥ 0.1 MGD east of the fall line and ≥ 0.5 MGD west of the fall line) within the Chesapeake Bay watershed have mostly upgraded to remove Total Nitrogen and in doing so convert ammonia-N to nitrate-N. The proposed water quality criteria will therefore mostly impact smaller facilities in the Chesapeake Bay watershed and any municipal facility outside of the Chesapeake Bay watershed. As a matter of practice, wastewater treatment plants designed to meet an ammonia limitation are generally designed to fully nitrify (remove all ammonia) so lower limitations do not necessarily mean that a wastewater treatment plant upgrade would be required. For most conventional activated sludge plants not currently using nutrient reduction technology, it may just require optimizing operational procedures to meet the new limitation. The largest potential impact is expected to be on facilities that discharge to very small receiving streams and older plants that do not treat wastewater using the activated sludge process.

There are 10 active VPDES permits with effluent limitations for cadmium. Fourteen have monitoring requirements but no limits. There are 10 active VPDES permits with effluent limitations for lead. Eighteen have monitoring requirements but no limits. There are 7 active VPDES permits with effluent limitations for human health parameters. Twenty-four have monitoring requirements but no limits.

Localities Particularly Affected

The Counties of Caroline, Carroll, Charles City, Chesterfield, Essex, Gloucester, Greensville, Hanover, Henrico, King George, King & Queen, King William, New Kent, Northumberland, Middlesex, Westmoreland and the City of Suffolk are affected by amendments

to reclassify certain water bodies as swamp waters. Botetourt County and the Cities of Roanoke and Salem are affected by the additional of special standard ee and ff to certain trout waters. Orange and Powhatan counties are affected by the application of special nutrient standards to two lakes. The remainder of the amendments are either applicable statewide or are not expected to impose any identified disproportionate material impact to a locality.

Projected Impact on Employment

For industrial plants that would face additional costs under the proposed amendments, the increased costs may be large enough to discourage expansion or the building of new plants. This would have a negative impact on employment. As described above, there are waters in Virginia where the proposed amendments will reduce compliance costs. For industrial plants located on these waters, the reduced costs could encourage expansion or the building of a new plant. This would have a positive impact on employment.

Effects on the Use and Value of Private Property

Depending on their particular situation in regard to the location of their discharge and the concentration of specific substances, pH, or temperature in the water at that location, firms with industrial plants that discharge to surface waters of the Commonwealth may face either increased or reduced costs.

Small Businesses: Costs and Other Effects

Some of the industrial plants that discharge to surface waters of the Commonwealth will be associated with small businesses. Some may face increased costs and others may encounter reduced costs, depending on their particular situation in regard to the location of their discharge and the concentration of specific substances, pH, or temperature in the water at that location.

Small Businesses: Alternative Method that Minimizes Adverse Impact

There are no clear alternative methods that would both comply with the Clean Water Act and cost less.

Real Estate Development Costs

The proposed amendments do not directly affect real estate development costs.

Legal Mandate

General: The Department of Planning and Budget (DPB) has analyzed the economic impact of this proposed regulation in accordance with § 2.2-4007.04 of the Code of Virginia and Executive Order Number 14 (2010). Section 2.2-4007.04 requires that such economic impact analyses determine the public benefits and costs of the proposed amendments. Further the report should include but not be limited to:

- the projected number of businesses or other entities to whom the proposed regulatory action would apply,
- the identity of any localities and types of businesses or other entities particularly affected,
- the projected number of persons and employment positions to be affected,
- the projected costs to affected businesses or entities to implement or comply with the regulation, and
- the impact on the use and value of private property.

Small Businesses: If the proposed regulatory action will have an adverse effect on small businesses, § 2.2-4007.04 requires that such economic impact analyses include:

- an identification and estimate of the number of small businesses subject to the proposed regulation,
- the projected reporting, recordkeeping, and other administrative costs required for small businesses to comply with the proposed regulation, including the type of professional skills necessary for preparing required reports and other documents,
- a statement of the probable effect of the proposed regulation on affected small businesses, and
- a description of any less intrusive or less costly alternative methods of achieving the purpose of the proposed regulation.

Additionally, pursuant to § 2.2-4007.1, if there is a finding that a proposed regulation may have an adverse impact on small business, the Joint Commission on Administrative Rules (JCAR) is notified at the time the proposed regulation is submitted to the *Virginia Register of Regulations* for publication. This analysis shall represent DPB's best estimate for the purposes of public review and comment on the proposed regulation.

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