Regulatory Impact Analysis

Rule Topic:	**High Rock Lake Chlorophyll-a Site Specific Standard**
Rule Citation:	15A NCAC 02B .0211 – Fresh Surface Water Quality Standards for Class C Waters
DEQ Division:	Division of Water Resources (DWR)
Staff Contacts:	Chris Ventaloro, Water Quality Standards Co-coordinator, DWR Christopher.Ventaloro@ncdenr.gov (919) 707-9016 Julie Ventaloro, Economist, DWR Julie.Ventaloro@ncdenr.gov (919) 707-9117
Impact Summary:	State government: No direct impact Local government: No direct impact Federal government: No direct impact Private entities: No direct impact Substantial Impact: No
Authority:	N.C.G.S. 143-214.1 and 143-215.3(a)

1. Necessity for Rule Change

The proposed amendments are being made to satisfy, in part, the North Carolina Nutrient Criteria Development Plan (NCDP) that was mutually agreed upon by North Carolina and the U.S. Environmental Protection Agency (U.S. EPA) in 2014 and revised in 2019. The proposed amendments are also being made to comply with Section 303(c)(1) of the Clean Water Act which requires that states and tribes evaluate and update water quality standards, as necessary. Lastly, the proposed amendments will establish site-specific criteria that will be used for future waterbody impairment determinations and development of a Total Maximum Daily Load (TMDL) in compliance with Section 303(d) of the Clean Water Act.

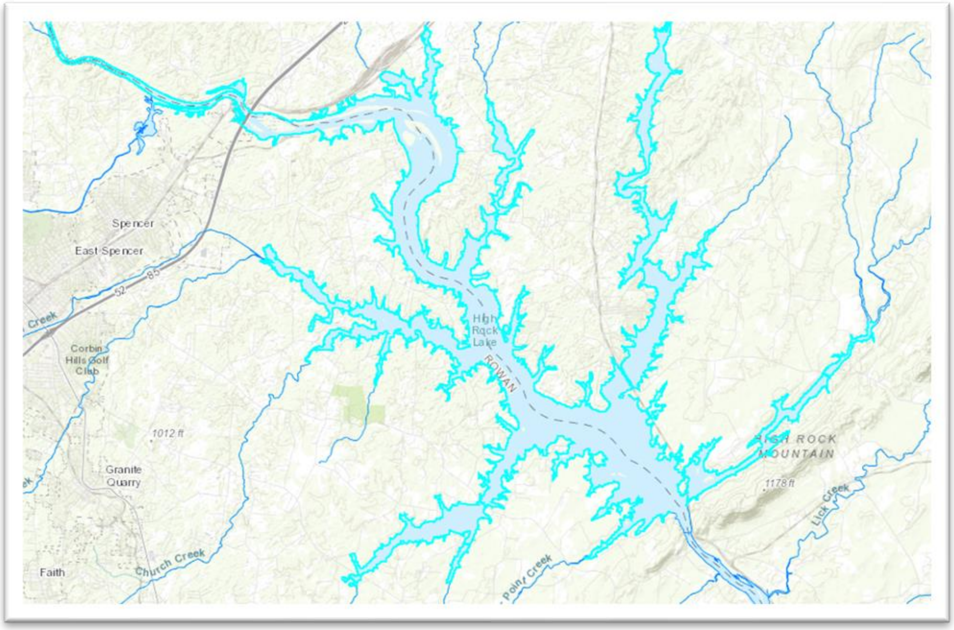
2. Background

2.1 High Rock Lake

The purpose of the proposed amendments to Rule 15A NCAC 02B .0211 is to establish a site-specific chlorophyll-a water quality standard for High Rock Lake and its tributaries (Figure 1). The site-specific chlorophyll-a standard will replace the existing chlorophyll-a standard for the entire lake. The existing chlorophyll-a standard will continue to apply to all other fresh surface waters in North Carolina.

Figure 1: High Rock Lake mainstem and tributaries

Highlighted areas are subject to the proposed site-specific chlorophyll-a standard.



High Rock Lake is a 15,180-acre reservoir with a 3,974-square mile drainage area located on the Yadkin River (Figure 2). The High Rock Lake drainage area is in the Piedmont

Figure 2: High Rock Lake Drainage Area

physiographic region, just south and east of the Blue Ridge Mountains. Historically the area had extensive agriculture, but over recent decades there has been a decline in agricultural land use and an increase in urban development. Multiple urban centers are located within the High Rock Lake drainage area and include the Cities of High Point, Lexington, Salisbury, Thomasville, and Winston-Salem. The drainage area includes part or all of 14 North Carolina counties – Alexander, Alleghany, Ashe, Caldwell, Davidson, Davie, Forsyth, Guilford, Iredell, Rowan, Stokes, Surry, Watauga, Wilkes, and Yadkin – plus a small area in Carroll and Patrick Counties, Virginia. The lake is used as a source for public drinking water as well as for recreational activities such as fishing, boating, and swimming.

High Rock Lake is currently on North Carolina's Section 303(d) list of impaired or threatened waters. The entire lake is impaired for chlorophyll-a and parts of the lake are impaired for pH and turbidity (as per the 2018 303(d) list). The technical implication of failing to meet the chlorophyll-a standard is that the lake is not fully supporting its designated uses, including aquatic life propagation and maintenance of biological integrity, wildlife, primary recreation, secondary recreation, and agriculture. Practical implications include that the lake supports a less diverse, less healthy biota, recreation becomes less attractive, and water treatment costs increase. The regulatory implication is that North Carolina is required by the Clean Water Act to develop a TMDL (and/or TMDL alternative such as a Nutrient Management Strategy) to fully restore designated uses.

If adopted, the proposed chlorophyll-a standard will be used for future impairment determinations for High Rock Lake. The adoption of the proposed standard is just the first step in a multi-step, multi-year process to refine our understanding of the degree of impairment of High Rock Lake and develop a TMDL and/or Nutrient Management Strategy for the drainage area to address the impairment.

2.2 Nutrient Criteria Development Plan (NCDP)

The North Carolina Nutrient Criteria Development Plan (NCDP) commits North Carolina to evaluate site-specific nutrient-related criteria for three pilot water bodies, each representing a distinct water body type. Those pilot water bodies are High Rock Lake (lake), Albemarle Sound (estuary), and the Middle Cape Fear river system (river and streams). The NCDP was mutually agreed upon by North Carolina and the U.S. EPA in 2014 and was renewed in 2019 with minor revisions. Based upon lessons learned from these site-specific evaluations, North Carolina will be better positioned to reevaluate nutrient-related criteria statewide.

In the context of the NCDP, the term "nutrient" refers to nitrogen and phosphorus. Nitrogen and phosphorus are natural parts of aquatic ecosystems that support the growth of algae and aquatic plants. In turn, algae and aquatic plants provide food and habitat for fish, shellfish, and smaller aquatic organisms. However, when nutrient levels are too high – usually the result of a wide range of human activities – they can cause an overgrowth of algae that harm water quality by decreasing the amount of oxygen available to fish and other aquatic life. Algal blooms can also be harmful to humans if they come into contact with polluted water, consume tainted fish or shellfish, or drink contaminated water. Common sources of excess levels of nitrogen and phosphorus are fertilizers, septic systems, sewage treatment plants and urban stormwater runoff. An aquatic system that has excess levels of nutrients is referred to as "eutrophic."

Chlorophyll-a is used as a measure of the amount of algae growing in a waterbody. High levels of chlorophyll-a can be an indicator of water quality impairment in eutrophic systems.

Chlorophyll allows plants, which include algae, to photosynthesize (i.e., use sunlight to convert simple molecules into organic compounds). Chlorophyll-a is the predominant type of chlorophyll found in green plants and algae.

The NCDP's focus is on the development of nutrient criteria based primarily on the linkage between nutrient-related parameters (e.g., dissolved oxygen, pH, water clarity, chlorophyll-a) and the protection of designated uses (e.g., drinking water supply, fishing, swimming). Of the three pilot water bodies outlined in the NCDP, High Rock Lake was chosen as the first one for evaluation. The proposed chlorophyll-a standard for High Rock Lake is the result of a multiyear evaluation process conducted in accordance with the NCDP. The site-specific standard includes both narrative and numeric components and incorporates recommendations on spatial extent, temporal period (growing season), and depth to which the standard would apply within a waterbody and identifies the waterbodies to which the standard would be applicable.

More detailed information about the NCDP and the associated nutrient criteria development process are available on the DEQ website: https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/nutrient-criteria-development-plan.

3. Regulatory Baseline

As part of the permanent rulemaking process, North Carolina General Statute 150B-19.1 requires agencies to quantify to the "greatest extent possible" the costs and benefits to affected parties of a proposed rule. To understand what the costs and benefits of the proposed rule changes would be to regulated parties and the environment, it is necessary to establish a regulatory baseline for comparison. For the purpose of this regulatory impact analysis, the baseline is comprised of the current version of Rule 15A NCAC 02B .0211 (effective Nov 1, 2019).

The current rule, which includes narrative and numeric components of the chlorophyll-a water quality standard, comprises the baseline for comparing the relative costs and benefits of the proposed site-specific standard; however, it should be noted that the standard itself does not have a direct impact on regulated parties or the environment. It is through its application in permits (e.g., wastewater effluent limits, stormwater benchmarks), waterbody impairment assessments, and nutrient management strategies that its impact is realized. For this reason, this analysis takes into account how the existing standard is currently being implemented in various regulatory programs and considers implementation of the standard a part of the baseline.

4. Proposed Amendments

The proposed site-specific chlorophyll-a standard of 35 µg/L (growing-season geometric mean) will replace the existing chlorophyll-a standard of 40 µg/L (instantaneous, year-round) for High Rock Lake. The proposed standard also includes temporal and spatial components. In the existing standard, the temporal and spatial components are applied through the approved assessment methodology rather than being described in the rule itself. Both the existing and proposed standards have equivalent narrative components that provide broad protections beyond the numeric components.

A direct comparison between the existing chlorophyll-a standard of 40 µg/L and the proposed site-specific standard of 35 µg/L cannot be made because they use different statistical measures -- the proposed 35 µg/L is a measure of central tendency (geometric mean) calculated from data within a defined growing season (April – October), while the existing 40 µg/L is an instantaneous measure that applies year round. To provide some idea of the potential indirect impacts of the proposed rule amendments, however, we conducted a preliminary analysis using the High Rock Lake hydrodynamic and nutrient response model to estimate the relative percent reductions in nutrient loading that would be required to meet the proposed standard relative to the existing standard. Using the available model, our preliminary analysis suggested the following load reductions will be needed when nitrogen only or phosphorus only will be reduced (Table 1).

Table 1: Estimated Potential Maximum Percent Reduction in Total Nitrogen (TN) and Total Phosphorus (TP) needed to meet Chlorophyll-a Standards

Chlorophyll-a Standard	Maximum % TN Reduction Needed*	Maximum % TP Reduction Needed†
Existing 40 µg/L *instantaneous*	48.5%	42%
Proposed 35 µg/L *growing season geometric mean*	50%	37%
Difference percentage points	-1.5	5

* assumes no increase in TP load from the baseline

† assumes no increase in TN load from the baseline

Based on the results of the preliminary analysis in Table 1, it seems likely that there will be some difference in magnitude of nutrient reductions needed to meet the existing chlorophyll-a standard as compared to the proposed site-specific chlorophyll-a standard. It is possible that the percent TN reduction needed could be higher under the proposed standard, while the percent TP reduction needed could be lower. These differences could have significant impacts on the relative costs of reductions required to address the lake's impairment. It is highly unlikely that the lake's impairment status itself will change as a result of the proposed site-specific chlorophyll-a standard.

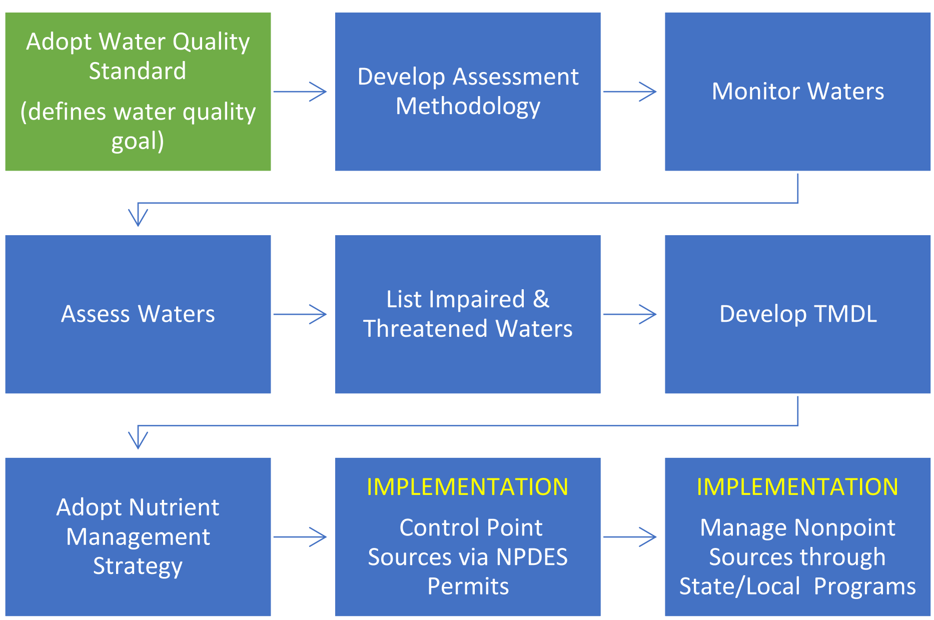
The estimated percent reductions in Table 1 are only preliminary, however, and are likely to change based on the outcome of a likely Nutrient Management Strategy stakeholder development process. It should also be noted that the estimated percent reductions in Table 1 do not necessarily reflect the most appropriate strategy for meeting the chlorophyll-a standard. This analysis was based on models that assumed that measures taken to reduce TN would have no effect on TP and vice versa. For example, the model assumed that a reduction of 50% of TN over the baseline loading would be required for High Rock Lake to meet the proposed chlorophyll-a standard (at that particular sampling location) if the TP load remained at baseline loading. Similar assumptions were made for TP: a reduction of 37% of TP over the baseline loading would be required for High Rock lake to meet the proposed chlorophyll-a standard if the TN load remained at baseline loading. This is compared to estimated reductions of 48.5% TN and 42% TP reductions needed to meet the existing chlorophyll-a standard at that particular sampling location. A more likely strategy would involve a combination of TN and TP reductions which may reduce slightly the percent reductions needed for a TN- or TP-only approach. It should also be noted that this preliminary analysis was done for one sampling station which has the highest chlorophyll-a levels relative to the other stations in High Rock Lake.

5. Cost-Benefit Analysis

The purpose of this document is to examine the potential economic impacts (costs and benefits) of the proposed site-specific chlorophyll-a standard. As with other surface water quality standards, the chlorophyll-a standard is designed to define the condition of waters that protect public and environmental health. Since water quality standards are developed to define an appropriate condition, the water quality standards themselves do not produce costs for the public. Costs and benefits are incurred, however, when the standards are implemented through the states' regulatory programs.

In the case of chlorophyll-a, there are additional steps that need to occur after adoption of the standard and before implementation can occur, as shown in Figure 3.

Figure 3: Steps from Adoption of Standard to Implementation



In waters within North Carolina that have been listed as "impaired" using the approved assessment methodology, water quality standards are used as water quality goals for the development of Total Maximum Daily Loads (TMDLs). The TMDL Program is a federal program authorized under the Clean Water Act to address waters that are not meeting water quality standards. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards.

In North Carolina, an integral part of the TMDL process for waters impaired for nutrients is the creation of a comprehensive Nutrient Management Strategy. This strategy includes nitrogen and phosphorous load allocations for both point and nonpoint sources in the affected watershed. Once a Nutrient Management Strategy is adopted by the EMC through the rulemaking process (and approved by U.S. EPA if it is being adopted as an alternative to a TMDL), the pollution limits calculated for the load allocations can be enforced under the state NPDES program through permitting. For example, in a waterbody with a TMDL for nutrients, a wastewater treatment plant may be required to implement additional treatment technology to reduce nitrogen and/or phosphorus loading.

The requirement for DWR to develop a TMDL and nutrient management strategy already exists due to the existing impairment of High Rock Lake; as such, the adoption of the proposed site-specific chlorophyll-a standard will not result in the imposition of any new burdens on DWR in this regard.

In the future, High Rock Lake will continue to be assessed for chlorophyll-a impairment, but those assessments will be based on the site-specific water quality standard. After the adoption of the site-specific standard, DWR will develop and incorporate the site-specific assessment methodology into the existing 303(d) Listing and Delisting Methodology which is the framework used by the DWR to interpret data and information to determine whether a waterbody is meeting water quality standards. A preliminary review of possible assessment recommendations was performed by DWR to ensure that the recommended site-specific chlorophyll-a standard can be practically and functionally assessed once adopted. Staff estimated the time to perform the task of adding the site-specific component to the existing methodology will be negligible. This task will not require additional expenditure, distribution, or reallocation of State funds.

While the adoption of the standard will establish a more specific water quality improvement goal, any costs associated with meeting that goal will occur well into the future and will be more directly associated with implementation. Benefits and costs associated with implementation will be accounted for during future nutrient management strategy rulemaking; as such, we have not attempted to quantify or monetize impacts in this analysis. However, to provide some context with which to consider the indirect, long-term impacts of the proposed site-specific standard, we have included an overview of typical nutrient reduction strategies and their associated costs and benefits.

Given the large load reduction needed and recognizing the significant cost to implement the necessary reductions, any future Nutrient Management Strategy will likely allow for a staged management approach (i.e., "adaptive management"). A staged management approach relies on first making nutrient reductions based on readily achievable controls that are possible with currently available technology. This would be followed by more substantial reductions to the extent that is technologically and economically feasible. The adaptive management aspect of the strategy allows for ongoing evaluation during implementation to inform possible revisions to the strategy and implementation. The lake's response is monitored during every stage to maximize the cost effectiveness of nutrient reduction efforts.

Based on DWR staff expertise and prior fiscal analyses for proposed Nutrient Management Strategies, it is reasonable to expect that nutrient sources that will need to be addressed include agriculture, wastewater discharges, and stormwater runoff from both new development and existing developed lands. It is also reasonable to expect that the total costs associated with implementing a nutrient reduction strategy for High Rock lake would be on the order of tens of millions of dollars to hundreds of millions of dollars. Costs would likely be incurred over the course of ten or more years and would likely be incurred by a wide range of entities including private- and government-owned wastewater dischargers, developers, state and local government stormwater programs, and the agricultural community.

The likely benefits expected from successful implementation of nutrient reductions in High Rock Lake include improvements in raw water quality which would help lower drinking water treatment costs through reductions of chemical treatment needed and could also avoid potential future costs of expensive treatment upgrades. There would also likely be improved conditions for primary contact recreation which include swimming, fishing, boating, and skiing, as well as a lower risk of the occurrence of harmful algal blooms which have the potential to release algal toxins into the water. Improvement in the water quality would also likely have a positive impact on local property values in general, increasing with greater proximity to the lake, and would serve to enhance the greater local economy through increased desire to live near a healthy, sustainable natural resource. Significant benefits to aquatic life would also be expected due to reduced occurrences of algal blooms and sediment contributions due to lower nutrient loading in the watershed. This would assist in meeting the water quality standards for turbidity, dissolved oxygen, pH as well as chlorophyll-a.

These (indirect) costs and benefits would likely occur whether or not the proposed site-specific chlorophyll-a standard is adopted since the lake is already impaired when assessed against the existing chlorophyll-a standard; as such, we are already committed to developing a TMDL and Nutrient Management Strategy for High Rock Lake. There are too many unknown variables to determine if (indirect) costs and benefits associated with a future Nutrient Management Strategy will be higher or lower based on the site-specific standard versus the existing standard.

5. SUMMARY

The agency anticipates that if the site-specific chlorophyll-a standard is adopted as proposed, the changes would not result in any direct or near-term economic impacts as compared to the regulatory baseline to state government, local government, or the regulated community. The main direct impact from the adoption of the site-specific chlorophyll-a standard will be a more refined understanding of the degree of impairment of High Rock Lake. This will enable the state to develop an appropriate TMDL and/or Nutrient Management Strategy to address the impairment.

Potentially significant long-term, indirect economic impacts (costs and benefits) are possible as a result of the proposed standard as compared to the baseline. However, we cannot predict the magnitude of costs or benefits (indirectly) attributable to the proposed site-specific standard as compared to the baseline existing standard. These impacts would not be realized until after a TMDL is developed and a nutrient management strategy is adopted. Costs and benefits, including benefits to the environment, will be accounted for during the future rulemaking to adopt a Nutrient Management Strategy.

15A NCAC 02B .0202 is proposed for amendment as follows:

15A NCAC 02B .0211 FRESH SURFACE WATER QUALITY STANDARDS FOR CLASS C WATERS

In addition to the standards set forth in Rule .0208 of this Section, the following water quality standards shall apply to all Class C waters. Additional standards applicable to other freshwater classifications are specified in Rules .0212, .0214, .0215, .0216, .0218, .0219, .0223, .0224, .0225, and .0231 of this Section.

(1) The best usage of waters shall be aquatic life propagation, survival, and maintenance of biological integrity (including fishing and fish); wildlife; secondary contact recreation as defined in Rule .0202 of this Section; agriculture; and any other usage except for primary contact recreation or as a source of water supply for drinking, culinary, and food processing purposes. All freshwaters shall be classified to protect these uses at a minimum.

(2) The conditions of waters shall be such that waters are suitable for all best uses specified in this Rule. Sources of water pollution that preclude any of these uses on either a shortterm or -longterm- basis shall be deemed to violate a water quality standard;

(3) Chlorine, total residual: 17 ug/l;

(4) Chlorophyll a (corrected): except as specified in Sub-Item (a) of this Item, not greater than 40 ug/l for lakes, reservoirs, and other waters subject to growths of macroscopic or microscopic vegetation not designated as trout waters, and not greater than 15 ug/l for lakes, reservoirs, and other waters subject to growths of macroscopic or microscopic vegetation designated as trout waters (not applicable to lakes or reservoirs less than 10 acres in surface area). The Commission or its designee may prohibit or limit any discharge of waste into surface waters if the surface waters experience or the discharge would result in growths of microscopic or macroscopic vegetation such that the standards established pursuant to this Rule would be violated or the intended best usage of the waters would be impaired;

(a)Site-specific High Rock Lake Reservoir [Index Numbers 12-(108.5), 12-(114), 12-117-(1), 12-117-(3), and 12-118.5] Chlorophyll a (corrected): not greater than a growing season geometric mean of 35 ug/L in the photic zone based on samples collected in a minimum of five different months during the growing season. For the purpose of this Sub-Item, the growing season is April 1 through October 31 and the photic zone is represented by a composite sample taken from the water surface down to twice the measured Secchi depth. Chlorophyll a shall not occur in amounts that result in an adverse impact as defined in 15A NCAC 02H .1002.

(5) Cyanide, total: 5.0 ug/l;

(6) Dissolved oxygen: not less than 6.0 mg/l for trout waters; for nontrout- waters, not less than a daily average of 5.0 mg/l with an instantaneous value of not less than 4.0 mg/l; swamp waters, lake coves, or backwaters, and lake bottom waters may have lower values if caused by natural conditions;

(7) Fecal coliform: shall not exceed a geometric mean of 200/100ml (MF count) based upon at least five samples taken over a 30-day period, nor exceed 400/100ml in more than 20 percent of the samples examined during such period. Violations of this Item are expected during rainfall events and may be caused by uncontrollable nonpoint source pollution. All coliform concentrations shall be analyzed using the membrane filter technique. If high turbidity or other conditions would cause the membrane filter technique to produce inaccurate data, the most probable number (MPN) 5-tube multiple dilution method shall be used.

(8) Floating solids, settleable solids, or sludge deposits: only such amounts attributable to sewage, industrial wastes, or other wastes as shall not make the water unsafe or unsuitable for aquatic life and wildlife or impair the waters for any designated uses;

(9) Fluoride: 1.8 mg/l;

(10) Gases, total dissolved: not greater than 110 percent of saturation;

(11) Metals:

(a) With the exception of mercury and selenium, acute and chronic freshwater aquatic life standards for metals shall be based upon measurement of the dissolved fraction of the metal. Mercury and selenium water quality standards shall be based upon measurement of the total recoverable metal;

(b) With the exception of mercury and selenium, aquatic life standards for metals listed in this Sub-Item shall apply as a function of the pollutant's water effect ratio (WER). The WER shall be assigned a value equal to one unless any person demonstrates to the Division's satisfaction in a permit proceeding that another value is developed in accordance with the

"Water Quality Standards Handbook: Second Edition" published by the US Environmental Protection Agency (EPA-823-B-12-002), which is hereby incorporated by reference, including subsequent amendments and editions, and can be obtained free of charge at http://water.epa.gov/scitech/swguidance/standards/handbook/. Alternative site-specific standards may also be developed when any person submits values that demonstrate to the Commission that they were derived in accordance with the "Water Quality Standards Handbook: Second Edition, Recalculation Procedure or the Resident Species Procedure", which is hereby incorporated by reference including subsequent amendments and can be obtained free of charge at http://water.epa.gov/scitech/swguidance/standards/handbook/.

(c) Freshwater metals standards that are not hardness-dependent shall be as follows:

(i) Arsenic, dissolved, acute: WER· 340 ug/l;
(ii) Arsenic, dissolved, chronic: WER· 150 ug/l;
(iii) Beryllium, dissolved, acute: WER· 65 ug/l;
(iv) Beryllium, dissolved, chronic: WER· 6.5 ug/l;
(v) Chromium VI, dissolved, acute: WER· 16 ug/l;
(vi) Chromium VI, dissolved, chronic: WER· 11 ug/l;
(vii) Mercury, total recoverable, chronic: 0.012 ug/l;
(viii) Selenium, total recoverable, chronic: 5 ug/l;
(ix) Silver, dissolved, chronic: WER· 0.06 ug/l;

(d) Hardness-dependent freshwater metals standards shall be derived using the equations specified in Table A: Dissolved Freshwater Standards for Hardness-Dependent Metals. If the actual instream hardness (expressed as $CaCO_3$ or Ca+Mg) is less than 400 mg/l, standards shall be calculated based upon the actual instream hardness. If the instream hardness is greater than 400 mg/l, the maximum applicable hardness shall be 400 mg/l.

Table A: Dissolved Freshwater Standards for Hardness-Dependent Metals
Numeric standards calculated at 25 mg/l hardness are listed below for illustrative purposes. The Water Effects Ratio (WER) is equal to one unless determined otherwise under Sub-Item (11)(b) of this Rule.

Metal	Equations for Hardness-Dependent Freshwater Metals (ug/l)	Standard at 25 mg/l hardness (ug/l)
Cadmium, Acute	WER· [{1.136672-[ln hardness](0.041838)} · e^{0.9151 [ln hardness]-3.1485}]	0.82
Cadmium, Acute, Trout waters	WER· [{1.136672-[ln hardness](0.041838)} · e^{0.9151[ln hardness]-3.6236}]	0.51
Cadmium, Chronic	WER· [{1.101672-[ln hardness](0.041838)} · e^{0.7998[ln hardness]-4.4451}]	0.15
Chromium III, Acute	WER· [0.316 · e^{0.8190[ln hardness]+3.7256}]	180
Chromium III, Chronic	WER· [0.860 · e^{0.8190[ln hardness]+0.6848}]	24
Copper, Acute	WER· [0.960 · e^{0.9422[ln hardness]-1.700}] Or, Aquatic Life Ambient Freshwater Quality Criteria-Copper 2007 Revision (EPA-822-R-07-001)	3.6 NA
Copper, Chronic	WER· [0.960 · e^{0.8545[ln hardness]-1.702}] Or, Aquatic Life Ambient Freshwater Quality Criteria-Copper 2007 Revision	2.7 NA

	(EPA-822-R-07-001)	
Lead, Acute	WER· [{1.46203-[ln hardness](0.145712)} · e^{1.273[ln hardness]-1.460}]	14
Lead, Chronic	WER· [{1.46203-[ln hardness](0.145712)} · e^{1.273[ln hardness]-4.705}]	0.54
Nickel, Acute	WER· [0.998 · e^{0.8460[ln hardness]+2.255}]	140
Nickel, Chronic	WER· [0.997 · e^{0.8460[ln hardness]+0.0584}]	16
Silver, Acute	WER· [0.85 · e^{1.72[ln hardness]-6.59}]	0.30
Zinc, Acute	WER· [0.978 · e^{0.8473[ln hardness]+0.884}]	36
Zinc, Chronic	WER· [0.986 · e^{0.8473[ln hardness]+0.884}]	36

(e) Compliance with acute instream metals standards shall only be evaluated using an average of two or more samples collected within one hour. Compliance with chronic instream metals standards shall only be evaluated using an average of a minimum of four samples taken on consecutive days or as a 96-hour average;

(12) Oils, deleterious substances, or colored or other wastes: only such amounts as shall not render the waters injurious to public health, secondary recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated uses. For the purpose of implementing this Rule, oils, deleterious substances, or colored or other wastes shall include substances that cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines, as described in 40 CFR 110.3(a)-(b), incorporated by reference including subsequent amendments and editions. This material is available, free of charge, at: http://www.ecfr.gov/;

(13) Pesticides:

(a) Aldrin: 0.002 ug/l;
(b) Chlordane: 0.004 ug/l;
(c) DDT: 0.001 ug/l;
(d) Demeton: 0.1 ug/l;
(e) Dieldrin: 0.002 ug/l;
(f) Endosulfan: 0.05 ug/l;
(g) Endrin: 0.002 ug/l;
(h) Guthion: 0.01 ug/l;
(i) Heptachlor: 0.004 ug/l;
(j) Lindane: 0.01 ug/l;
(k) Methoxychlor: 0.03 ug/l;
(l) Mirex: 0.001 ug/l;
(m) Parathion: 0.013 ug/l; and
(n) Toxaphene: 0.0002 ug/l;

(14) pH: shall be between 6.0 and 9.0 except that swamp waters may have a pH as low as 4.3 if it is the result of natural conditions;

(15) Phenolic compounds: only such levels as shall not result in fish-flesh tainting or impairment of other best usage;

(16) Polychlorinated biphenyls (total of all PCBs and congeners identified): 0.001 ug/l;

(17) Radioactive substances, based on at least one sample collected per quarter:

(a) Combined radium-226 and radium-228: the average annual activity level for combined radium-226 and radium-228 shall not exceed five picoCuries per liter;

(b) Alpha Emitters: the average annual gross alpha particle activity (including radium-226, but excluding radon and uranium) shall not exceed 15 picoCuries per liter;

(c) Beta Emitters: the average annual activity level for strontium-90 shall not exceed eight picoCuries per liter, nor shall the average annual gross beta particle activity (excluding potassium-40 and other naturally occurring radionuclides) exceed 50 picoCuries per liter, nor shall the average annual activity level for tritium exceed 20,000 picoCuries per liter;

(18) Temperature: not to exceed 2.8 degrees C (5.04 degrees F) above the natural water temperature, and in no case to exceed 29 degrees C (84.2 degrees F) for mountain and upper piedmont waters and 32 degrees C (89.6 degrees F) for lower piedmont and coastal plain Waters; the temperature for trout waters shall not be increased by more than 0.5 degrees C (0.9 degrees F) due to the discharge of heated liquids, but in no case to exceed 20 degrees C (68 degrees F);

(19) Toluene: 0.36 ug/l in trout classified waters or 11 ug/l in all other waters;

(20) Trialkyltin compounds: 0.07 ug/l expressed as tributyltin;

(21) Turbidity: the turbidity in the receiving water shall not exceed 50 Nephelometric Turbidity Units (NTU) in streams not designated as trout waters and 10 NTU in streams, lakes, or reservoirs designated as trout waters; for lakes and reservoirs not designated as trout waters, the turbidity shall not exceed 25 NTU; if turbidity exceeds these levels due to natural background conditions, the existing turbidity level shall not be increased. Compliance with this turbidity standard shall be deemed met when land management activities employ Best Management Practices (BMPs), as defined by Rule .0202 of this Section, recommended by the Designated Nonpoint Source Agency, as defined by Rule .0202 of this Section.

(22) Toxic Substance Level Applicable to NPDES Permits: Chloride: 230 mg/l. If chloride is determined by the waste load allocation to be exceeded in a receiving water by a discharge under the specified 7Q10 criterion for toxic substances, the discharger shall monitor the chemical or biological effects of the discharge. Efforts shall be made by all dischargers to reduce or eliminate chloride from their effluents. Chloride shall be limited as appropriate in the NPDES permit if sufficient information exists to indicate that it may be a causative factor resulting in toxicity of the effluent.

History Note: *Authority G.S. 143-214.1; 143-215.3(a)(1);*
Eff. February 1, 1976;
Amended Eff. January 1, 2015; May 1, 2007; April 1, 2003; August 1, 2000; October 1, 1995; August 1, 1995; April 1, 1994; February 1, 1993;
Readopted Eff. ~~November 1, 2019.~~ November 1, 2019;
Amended Eff. Xxxxx