Regulatory Impact Analysis

Rule Topic: 2020-2022 Triennial Review -- Surface Water Quality Standards

Rule Citations:
15A NCAC 02B .0202 – Definitions
15A NCAC 02B .0208 – Standards for Toxic Substances and Temperature
15A NCAC 02B .0211 – Fresh Surface Water Quality Standards for Class C Waters
15A NCAC 02B .0212 – Fresh Surface Water Quality Standards for Class WS-I Waters
15A NCAC 02B .0214 – Fresh Surface Water Quality Standards for Class WS-II Waters
15A NCAC 02B .0215 – Fresh Surface Water Quality Standards for Class WS-III Waters
15A NCAC 02B .0216 – Fresh Surface Water Quality Standards for Class WS-IV Waters
15A NCAC 02B .0218 – Fresh Surface Water Quality Standards for Class WS-V Waters
15A NCAC 02B .0219 – Fresh Surface Water Quality Standards for Class B Waters
15A NCAC 02B .0220 – Tidal Salt Water Quality Standards for Class SC Waters
15A NCAC 02B .0301 – Classifications: General
15A NCAC 02B .0311 – Cape Fear River Basin

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Impact Summary:

State government:	Net benefits to DEQ due to switch from Fecal Coliform (FC) to *E. Coli* pathogen indicator (02B .0219).
Local government:	Net benefits due to revised Cadmium and Cyanide standards; potential zero to minimal costs due to revised Selenium standard (02B .0211; 02B .0220).
Federal government:	No impact.

	Private entities:	Net benefits due to revised Cadmium and Cyanide standards; potential zero to minimal costs due to revised Selenium standard (02B .0211; 02B .0220).
	Substantial Impact:	Total annual economic impact (costs + benefits) is not projected to exceed > $1,000,000.
Authority:	N.C.G.S. 143-214.1 and 215.3(a)	
Necessity:	To comply with the Clean Water Act (CWA) which requires that states and tribes evaluate and revise, as necessary, water quality standards at least once every three years. This process is known as the "Triennial Review."	
Appendices:	References Lists of NPDES wastewater permits with limits Proposed rule text	

1. EXECUTIVE SUMMARY

The purpose of this document is to provide an analysis of the fiscal impacts associated with proposed amendments to the surface water quality standards (or "the standards") in Rules 15A NCAC 02B .0200 and .0300. The amendments are in compliance with Section 303(c)(1) of the Clean Water Act which requires that states and tribes evaluate and revise, as necessary, water quality standards at least once every three years. This process is known as the "Triennial Review."

Revision of the subject rules is required by the Clean Water Act to ensure that the standards reflect the current state of the science with regard to protective health and toxicological information. The proposed revisions will allow North Carolina to better protect human health and aquatic life, thereby continuing to meet the objectives of the Clean Water Act.

In addition to several minor technical changes and rule language updates, DWR is proposing revisions and additions to numeric and narrative standards for the following substances:

- 1,4-dioxane: Codify existing "in-stream target values" (ITVs) as standards for freshwater fish consumption and water supply waters;
- Selenium: Revise aquatic life freshwater standard;
- Cadmium: Revise aquatic life freshwater and saltwater standards;
- Cyanide: Revise aquatic life freshwater standard;
- E. coli: Replace FC bacterial indicator with *E. coli* for Class B waters in the Asheville Regional Office area.

In accordance with the Clean Water Act, the proposed amendments to 15A NCAC 02B .0200 and .0300 comprise the state's 2020-2022 Triennial Review of surface water quality standards.

As part of the North Carolina 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. The agency anticipates that if the surface water quality standards are adopted as proposed, the changes would result in the following direct, near-term economic impacts:

- The changes to the cadmium and cyanide standards are likely to result in significant benefits to a small number of local government and private entities in the form of avoided costs due to reduced wastewater treatment and discharge monitoring requirements. Cost savings to additional permitted NPDES wastewater facilities are possible for either of these parameters but are less likely for cyanide;

- The addition of the *E. coli* standard is likely to result in modest net benefits to the DEQ laboratory in Asheville in the form of opportunity cost savings, despite the higher cost of the preferred Colilert® test method as compared to fecal coliform by membrane filtration method. Although we did not attempt to monetize cost savings to commercial laboratories, they could see similar cost savings if they choose to use the Colilert® method; and

- Minimal costs to a small number of NPDES wastewater dischargers are possible, but unlikely, due to the change to the selenium standard. Due to data limitations, there is uncertainty about whether additional permittees will be impacted, but we are reasonably certain that unanticipated impacts will be small.

These estimates were based on the best available data and reasonable assumptions. The Division was not able to analyze all potentially impacted permits due to staff and time constraints. For the permits for which we were able to perform more in-depth analyses, there are unknown variables that could result in different outcomes at the time of permit renewal. Based on our best available information and acknowledging the limitations of our analyses, we estimate that the quantified net economic impact (benefits minus costs) to regulated parties, local government and state government is approximately **$3.96 million Net Present Value (NPV) over a 10-year period** using 2021 dollars discounted at a rate of 7%.

In addition to the quantified impacts to regulated parties and state government, we anticipate the following indirect, long-term unquantified impacts to human health and the environment:

- Positive impacts to aquatic life are possible from potential, but unlikely, reductions (or avoided increases) in selenium concentrations in wastewater discharges. Reductions (or avoided increases) in selenium could also positively impact aquatic habitat which supports commercial and recreational fisheries. These potential impacts are unlikely due to the fact that the facilities most likely to receive new treatment requirements (based on reasonable potential analyses) are planning to retire their operations before permit renewal or anticipated schedules of compliance would go into effect;

- Positive impacts to aquatic life are possible from more accurate assessment of waterbodies for impairment for selenium based on the new fish tissue standard and the lower water column

standard. It is reasonable to expect that the revised selenium standard will be a factor in future assessments and possible TMDL development;

- Positive impacts to aquatic life are possible, but unlikely, as a result of more accurate assessment of waterbodies for impairment for pathogenic indicators using *E. coli.* This potential impact is unlikely because the adoption of the *E. coli* standard is not expected to increase the potential for development of TMDLs as compared to the fecal coliform standard;

- It is reasonable to expect future positive impacts to human health as a result of assessment of waterbodies for impairment and possible TMDL development for 1,4-dioxane;

- There are likely substantial ongoing human health benefits due to implementation of the 1,4-dioxane ITVs, which will be unchanged by codifying the existing ITVs into rule. Since these impacts from regulating 1,4-dioxane are ongoing and are not the result of the proposed rulemaking, we have not included benefit/cost estimates for 1,4-dioxane in this analysis;

- The higher (less stringent) freshwater cadmium standard will not result in unacceptable toxicity effects to aquatic organisms; and

- The change to the cyanide standard will provide at least equivalent environmental protection.

2. BACKGROUND

2.1 Purpose

The purpose of the water quality standards is to protect surface waters from the deleterious effects of pollution. Surface waters are protected based on their established "uses." Each surface water in the State receives a classification that defines the uses that apply and the water quality standards established to protect those uses. The classifications and standards are codified in the subject rules.

2.2 What are "water quality standards"?

Water quality standards are "provisions of state, territorial, authorized tribal or federal law approved by the U.S. Environmental Protection Agency (EPA) that describe the desired condition of a water body and the means by which that condition will be protected or achieved."[1] The standards consist of three required components:

- designated uses of a water body such as "aquatic life propagation and survival," "recreation," "shellfishing," and "drinking water;"
- water quality criteria necessary to protect the designated uses; and
- antidegradation requirements.

[1] https://www.epa.gov/standards-water-body-health/what-are-water-quality-standards

The North Carolina Environmental Management Commission (EMC) assigns classifications to all surface waters in North Carolina to protect the waterbodies for their designated uses. Existing rules establish the human and environmental health protection levels (e.g., cancer risk level from water consumption or fish mortality rate) that correspond with the most sensitive designated use of a water body. These use-based protection levels set the "goal posts" for the water quality criteria and remain unchanged.

The criteria (or "standards") are established as **numeric values** or **narrative statements**. Numeric standards establish a pollutant concentration value, or range of values, that are deemed to provide the level of protection defined by those pre-established "goal posts" (e.g., the proposed standard for cadmium in tidal waters is 7.9 ug/L for a chronic exposure for aquatic life). Narrative standards establish a broader descriptive protection, usually to address more complex scenarios where a numeric value is not feasible (e.g., "oils, deleterious substances, or colored or other wastes: only such amounts as shall not . . . impair the uses").

In addition to the required components, the Clean Water Act allows states and tribes to include additional components within the standards such as variances and mixing zones. Also, the narrative standard for toxics, as described in 15A NCAC 02B .0208, provides instructions for calculating numeric values, referred to here as In-stream Target Values (ITVs), for circumstances where regulatory values are required for substances that do not have existing surface water quality standards. ITVs are an important component of this analysis; they are discussed in Section 6 of this document.

Water quality standards are adopted into rule through the Triennial Review process.

2.3 Triennial Review Process

Under Section 303(c)(1) of the Clean Water Act, North Carolina is delegated the authority to establish water quality standards to protect human health and the aquatic environment. Under the federal delegation, North Carolina is expected to adopt water quality standards to protect all uses of the waters of the State. The requirements to develop and adopt appropriate classifications and standards are delegated to the EMC under North Carolina General Statutes 143-214.1 and 215.3(a). In accordance with these statutes, the EMC must consider the same designated uses and protections as directed by the federal government.

The Triennial Review process itself typically takes three years to complete and consists of the following steps:

(1) development of scientifically defensible criteria for specific chemicals or water quality characteristics (e.g., pH, DO, turbidity, etc.). This includes a review of EPA National Recommended Water Quality Criteria (NRWQC)[2]. The NRWQC are criteria published by EPA to assist states in establishing water quality standards for substances of national concern. Criteria are expressed as concentrations, levels, or narrative statements representing a quality

[2] https://www.epa.gov/wqc/national-recommended-water-quality-criteria-tables

of water that protects a particular use. When criteria are met, water quality will generally protect the designated use. For purposes of this document, we use the terms "criteria" and "standards" interchangeably.

In addition to reviewing the NRWQC and associated scientific information, DEQ considers other topics of interest to North Carolina, such as 1,4-dioxane. DEQ-DWR staff consult with various programs within DEQ as well as with other North Carolina state agencies (such as DHHS), universities, federal agencies (such as U.S. Fish and Wildlife Service and EPA), other states' environmental agencies, non-profit organizations and other stakeholder groups to gauge the needs of, or impacts to, various water quality protection programs.

(2) development of a Regulatory Impact Analysis to examine potential costs and benefits to the environment, regulated parties, and resource users;
(3) public hearing and comment period;
(4) review and response to public comment;
(5) adoption of the proposed criteria and standards into rule by the EMC;
(6) review and approval of the rule amendments by the NC Rules Review Commission (RRC); and
(7) review and approval of the adopted standards by the EPA.

DEQ anticipates holding public hearings for this proposed rulemaking no earlier than July 2021 and adoption into state rule no earlier than January 2022. We expect submittal to EPA no earlier than February 2022.

2.4 National Recommended Water Quality Criteria (NRWQC)

The proposed rule revisions, which include updates to standards for two metals (cadmium and selenium), the addition of an optional analysis method for cyanide, and the replacement of the fecal coliform recreational bacterial indicator with *E. coli* for Class B waters in the Asheville Regional Office area, will bring North Carolina into alignment with the substances' respective EPA National Recommended Water Quality (NRWQC). Note that there is not currently a NRWQC for 1,4-dioxane -- the proposed codification of NC's existing ITV for 1,4-dioxane will address a contaminant of emerging concern in North Carolina waters.

The NRWQC are based on toxicity data and risk analysis (scientific judgments about the relationship between the pollutant concentrations and environmental and human health effects). As the scientific body of knowledge evolves and new toxicity data become available for inclusion into the assessment, the EPA revises its NRWQC to reflect the most current scientifically defensible information. Changes to NRWQC are peer reviewed and go through a public review process. These criteria are published by the EPA under the requirements of Clean Water Act Section 304(a). EPA NRWQC do <u>not</u> reflect consideration of economic impacts nor the technological feasibility of meeting the chemical concentrations in ambient water.

2.5 Regulatory Programs that use the Surface Water Quality Standards

The standards are the foundation for various state water quality protection programs required by the Clean Water Act. They "establish the environmental baselines used for measuring the success of Clean Water Act programs" [3] and serve different purposes depending on the program, as follows:

2.5.1 NPDES Wastewater (direct and indirect dischargers)

The standards provide the regulatory basis for calculating water quality-based effluent limits for National Pollutant Discharge Elimination System (NPDES) wastewater permitting (including the Pretreatment Program). Water-quality based effluent limits, or "WQBELs," are permit limits that are based on surface water quality standards as opposed to limits based on treatment performance standards (technology-based effluent limits or "TBELS"). WQBELs are specific to each discharge and its receiving stream.

To determine the appropriate WQBELs for a given permit, the Division performs a Reasonable Potential Analysis (RPA) for each parameter of concern. An RPA helps the Division determine if a discharge has a reasonable potential to cause an exceedance of water quality standards in its receiving stream. RPAs are conducted at issuance and at each permit renewal, using the then-current characteristics of the discharger's effluent and the receiving stream. The RPA calculations are repeated for each parameter of concern and its respective standard. Each RPA consists of calculating the *maximum predicted effluent concentration* for the metal of concern, based on actual effluent data from the facility, and the *maximum allowable effluent concentration* based on the surface water standard and the dilution available in the stream under low-flow conditions.

Each RPA results in one of three determinations: 1) that a permit limit is warranted to protect water quality; 2) that a limit is not warranted but the substance is present in such concentrations that monitoring, but no limit, is advised; or 3) that no limit or monitoring is necessary. If a discharge is subject to both technology-based limits and one or more water quality-based limits for the same substance, the most stringent limitation is included in the facility's NPDES permit.

Effluent limits based on chronic standards (long-term impacts) are set as monthly average limits in the permit. Those based on acute standards (short-term impacts) are generally set as weekly average limits for publicly owned facilities and as daily maximum limits for private facilities. The NPDES program uses the same RPA methodology with all wastewater permits. The methodology has been approved by the EPA as being consistent with its national guidance[4].

The same way DEQ's NPDES program must routinely re-evaluate discharge limits and other permit requirements, municipalities with local pretreatment programs must

[3] https://www.epa.gov/sites/production/files/2014-10/documents/handbook-chapter1.pdf

[4] Technical Support Document for Water Quality-Based Toxics Control, EPA Document Number 505/2-90-001, March, 1991. https://www3.epa.gov/npdes/pubs/owm0264.pdf

evaluate whether, in addition to plant improvements and other measures, it is necessary to set limits on their significant industrial users in order for the Publicly-owned Treatment Works (POTWs) to comply with their limits.

POTWs with local pretreatment programs issue and administer local permits that are generally similar to the NPDES permits issued by DWR. Limits in local permits can be based on categorical pretreatment standards (if applicable) or Headworks Analyses calculated to prevent interference, pass-through, or sludge contamination. If a parameter is subject to more than one limit based on these objectives, the more stringent of the limits applies, just as with technology- and water quality-based limitations in NPDES permits.

Currently, there are 1,094 active NPDES permits. Of these, 114 local governments administer pretreatment programs for 137 POTWs (out of approx. 292 POTWs). These local pretreatment programs regulate approximately 592 Significant Industrial Users (SIUs) and other non-domestic wastewater sources, commonly known as 'indirect dischargers.'

2.5.2 NPDES Stormwater

The standards are often used for deriving benchmark monitoring values for NPDES industrial stormwater permitting. Benchmarks are written into permits to provide a guideline for determining the potential of the stormwater discharge to cause toxic impacts to the surface waters of the state. Stormwater benchmarks are not enforceable effluent limits. This difference is important because exceeding a wastewater effluent limit is a violation of permit, whereas exceeding a stormwater benchmark triggers a tiered response action on the part of the permittee. Exceedances of stormwater benchmarks may trigger a variety of stormwater pollution prevention actions and sometimes more frequent monitoring.

Stormwater benchmarks most often reflect *acute* aquatic life water quality standards. Acute standards are more frequently used to assess the potential for stormwater impacts to surface waters as the exposure scenarios of aquatic life to stormwater discharges are expected to be episodic due to the nature of stormwater flows. *Chronic* aquatic life standards and human health standards protect for a more constant, long-term exposure to a pollutant, which is often not appropriate for general stormwater exposures and, therefore, are not normally used in stormwater permitting unless a site-specific situation necessitates it.

2.5.3 Groundwater Protection

The surface water standards are used indirectly in various programs whose primary goal is to protect groundwater quality. For example, the standards are used for classifying the risk level of known discharges or releases from groundwater remediation sites that intercept surface waters. Groundwater remediation projects are designed such that they prevent violations of the surface water standards, which can result from an improperly managed discharge from the remediation project. These projects are most often under the

administration of the Division of Waste Management (landfills, hazardous waste, underground storage tanks, etc), although the Division of Water Resources does administer some permits related to groundwater remediation. DWR also administers the Non-discharge Program which permits sites for land application of biosolids among other things. Some permits under these programs have components that require monitoring of adjacent surface waters.

2.5.4 Assessment and Listing of Impaired Waters - 303(d)

The standards are used to help identify designated use impairments for listing waterbodies on the 303(d) Impaired Waters List. Water quality assessment is the process of collecting data and using that data to assess the quality of surface waters. The assessed waters are placed into one of five categories that describe the status of water quality. Assessment is conducted in three parts:

1) **Collection of water quality data** by DWR ambient monitoring staff and the NPDES Coalition Monitoring Program.[5] The Ambient Monitoring System (AMS) is a network of sampling stations established to provide site-specific, long-term water quality information on rivers, streams, and estuaries throughout North Carolina. Stations are visited regularly for the collection of a variety of physical, chemical, and bacterial pathogen samples and measurements. The AMS program has been active for over 40 years and currently has 329 active AMS stations located in all 17 major river basins of the state. Another component of the AMS program is the Random Ambient Monitoring System (RAMS) program. The RAMS program has been active for 14 years and serves to provide monitoring at random locations throughout the state, usually for smaller streams that are not normally sampled. About 30 RAMS stations are monitored regularly for a period of two years after which they are retired and new random stations are selected.

The NPDES Coalition Monitoring Program is a voluntary, discharger-led, ambient monitoring program that provides an effective and efficient means for assessing water quality in a watershed context. A monitoring coalition is a group of NPDES dischargers that combine resources to collectively fund and perform an instream monitoring program in lieu of performing the instream monitoring required by their individual NPDES permits. The collaboration frequently reduces monitoring costs for an individual discharger by sharing the burden across the coalition;

2) **Development of the assessment methodology** to describe how many exceedances of water quality standards a waterbody can have for a particular pollutant within a specified date range; and

3) **Comparison of the water quality sampling data to the water quality standard** using the assessment methodology to determine if it is “impaired.” Each monitored waterbody

[5] https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/ecosystems-branch/monitoring-coalition-program

receives an assessment every two years. The assessment helps DWR use state resources more efficiently by focusing our efforts on waters that need the most improvement.

2.5.5 TMDLs

The standards are used as water quality targets for the development of Total Maximum Daily Loads (TMDLs). The TMDL Program[6] 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. The TMDL is then used to establish limits on sources of the pollutant which are classified as either point sources (waste load allocation) or nonpoint sources (load allocation).

Once a TMDL is approved by the EPA, the pollution limits calculated for the waste load allocation (point sources) are enforced under the state NPDES program through permitting. For example, in a waterbody with a TMDL, a wastewater treatment plant may be required to implement additional treatment technology.

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 following:

- the most current version of rules in Sections 15A NCAC 02B .0100, .0200, and .0300 (effective Nov 1, 2019); and
- the in-stream target values (ITVs) for 1,4-dioxane, which are calculated from the translator equations in Rule 15A NCAC 02B .0208, and which are enforced as standards in compliance with Clean Water Act 40 CFR Part 131.11.

The current rules, which include narrative and numeric water quality standards, comprise the baseline for comparing the relative costs and benefits of the updated standards; however, it should be noted that the standards themselves do not have a direct impact on regulated parties or the environment. It is through their application in permits (e.g., wastewater effluent limits, stormwater benchmarks) and waterbody impairment assessments that their impact is realized. For this reason, this analysis takes into account how the standards are currently being implemented in various regulatory programs and considers implementation of the standards a part of the baseline.

[6] https://deq.nc.gov/about/divisions/water-resources/planning/modeling-assessment/tmdls

Other regulations and legal limitations that alleviate the impact of the proposed rule changes include:

- N.C. General Statute, Chapter 143, Article 21 which grants authority to DEQ and EMC to administer federally- mandated environmental management programs; and
- Clean Water Act 40 CFR Part 131.

4. SUMMARY OF PROPOSED RULE AMENDMENTS

The following tables contain summaries of each proposed rule change and its anticipated economic and environmental impact. The only changes that are substantive are related to the codification or revision of numeric standards. Those changes are discussed in greater detail in the sections that follow. All other changes are technical in nature and will not impose an additional burden on the regulated community, state agencies, or local governments.

Table 1: Summary of proposed changes to 15A NCAC 02B, Section .0200

Rule	Proposed Change	Economic Impact	Environment Impact
15A NCAC 02B .0202 Definitions	• Define "lentic" and "lotic." • Refine "industrial discharge."	None	No change
15A NCAC 02B .0208 Standards for Toxic Substances and Temperature	• Codify existing ITV to a freshwater standard for fish consumption for **1,4-dioxane.**	None †	Likely indirect, long-term benefit to human health* †
15A NCAC 02B .0211 Fresh Surface Water Quality Standards for Class C Waters	• Revise aquatic life freshwater standard for **selenium**.	Potential but unlikely small to significant cost to permittees †	Potential but unlikely near-term direct benefit to aquatic life; long-term indirect benefit likely †
	• Revise aquatic life freshwater standard for **cadmium**.	Potential likely significant benefit to permittees†	Continues to prevent unacceptable toxicity effects to aquatic life†
	• Revise aquatic life freshwater standard for **cyanide**.	Potential likely significant benefit to permittees†	At least equivalent environmental protection†
15A NCAC 02B .0212 Fresh Surface Water Quality Standards for Class WS-I Waters	• Codify existing ITV to a standard for water supply waters for **1,4-dioxane**.	None †	Possible indirect, long-term benefit to human health* †
15A NCAC 02B .0214 Fresh Surface Water Quality Standards for Class WS-II Waters	• Codify existing ITV to a standard for water supply waters for **1,4-dioxane**.	None †	Possible indirect, long-term benefit to human health* †

15A NCAC 02B .0215 Fresh Surface Water Quality Standards for Class WS-III Waters	• Codify existing ITV to a standard for water supply waters for **1,4-dioxane**. • Minor technical correction.	None †	Possible indirect, long-term benefit to human health* †
15A NCAC 02B .0216 Fresh Surface Water Quality Standards for Class WS-IV Waters	• Codify existing ITV to a standard for water supply waters for **1,4-dioxane**. • Minor technical correction.	None †	Possible indirect, long-term benefit to human health* †
15A NCAC 02B .0218 Fresh Surface Water Quality Standards for Class WS-V Waters	• Codify existing ITV to a standard for water supply waters for **1,4-dioxane**.	None †	Possible indirect, long-term benefit to human health* †
15A NCAC 02B .0219 Fresh Surface Water Quality Standards for Class B Waters	• Replace Fecal Coliform bacterial indicator with **E. coli** for counties in Asheville Regional Office area.	Likely small net benefit to the State, private labs†	Potential but unlikely indirect, long-term benefit to aquatic life†
15A NCAC 02B .0220 Tidal Salt Water Quality Standards for Class SC Waters	• Revise aquatic life saltwater standard for **cadmium.**	None	Continues to prevent unacceptable toxicity effects to aquatic life†

*There is an ongoing benefit to human health, but it cannot be attributed to the proposed rule change.
† The revised standards will be the foundation for impairment assessments. If assessments determine the need for a TMDL, benefits and costs associated with the TMDL would be accounted for during future rulemaking.

Table 2: Summary of proposed changes to 15A NCAC 02B, Section .0300

Rule	Proposed Change	Economic Impact	Environment Impact
15A NCAC 02B .0301 Classifications: General	• Recognize tribal authority.	None	No change
15A NCAC 02B .0311 Cape Fear River Basin	• Minor technical correction.	None	No change

5. COST-BENEFIT ANALYSIS -- OVERVIEW

The purpose of this document is to examine the potential economic impacts (costs and benefits) of the proposed surface water quality standards. Surface water quality standards are designed to define the condition of waters that protect public and environmental health. The Clean Water Act requires these standards to be based solely on science with no consideration of costs. Since the water quality standards are developed to define an appropriate condition, the water quality standards regulations themselves do not produce costs for the public. For this reason, federal water quality criteria promulgated under the Clean Water Act generally do not have an accompanying fiscal analysis conducted before criteria adoption. Consequently, there is no federal fiscal analysis to provide cost/benefit information on the proposed state rule changes addressed in this document.

Costs and benefits are incurred, however, when state and federal regulatory programs use the standards to implement their own rules. The potential impacts from the proposed standards are examined by parameter in Sections 6 through 10. Impacts to human health and the environment are considered in

Section 11. Section 12 considers challenges associated with incorporating environmental justice reviews into regulatory impact analyses. Alternatives to the proposed changes are presented in Section 13.

6. 1,4-DIOXANE

6.1 Rule Citations

15A NCAC 02B .0208(a)(2)(B)(xviii) -- Standards for Toxic Substances and Temperature
15A NCAC 02B .0212(3)(g)(xvii) -- Fresh Surface Water Quality Standards for Class WS-I Waters
15A NCAC 02B .0214(3)(g)(xvii) -- Fresh Surface Water Quality Standards for Class WS-II Waters
15A NCAC 02B .0215(3)(g)(xvii) -- Fresh Surface Water Quality Standards for Class WS-III Waters
15A NCAC 02B .0216(3)(g)(xvii) -- Fresh Surface Water Quality Standards for Class WS-IV Waters
15A NCAC 02B .0218(3)(g)(xvii) -- Fresh Surface Water Quality Standards for Class WS-V Waters

6.2 Proposed Change

DEQ is proposing to codify as numeric water quality standards the existing calculated human health criteria for 1,4-dioxane that are derived from 15A NCAC 02B .0208. These existing human health criteria can also be referred to as "in-stream target values" (ITVs). Both of these ITVs have been in place since about 2010. Values were based on the EPA's Integrated Risk Information System (IRIS)[7] carcinogenicity risk assessment completed in 2010. IRIS is a database of assessed toxicity values for human health effects resulting from chronic exposure to chemicals. DEQ's proposed numeric water quality standards for 1,4-dioxane (and current ITVs) use a 1 in 1,000,000 cancer risk level for the protection of the following designated uses:

- 0.35 µg/L in water supply waters for fish consumption + drinking water exposure; and
- 80 µg/L in all other surface waters for fish consumption exposure.

15A NCAC 02B .0208 provides the narrative water quality standard for toxic substances and includes an equation for translating the narrative standard to a numeric value or in-stream target value. The narrative water quality standard for toxic substances and the corresponding equations used to translate that narrative standard are critical to addressing substances that do not have individual numeric water quality standards and are supported by federal regulations. The ITVs calculated from using the translator equations in 15A NCAC 02B .0208(a) are implemented and enforced as standards in NPDES permits.

The narrative standards, including the translator equations for interpreting that narrative standard, were most recently approved by the EPA in April 2020. The EMC and DEQ have the authority to control toxins in surface water where no numeric water quality standard has been adopted under N.C.G.S. 143-211, Rule 15A NCAC 02B .0208, and the Clean Water Act, 40 CFR Part 131.11.

[7] https://www.epa.gov/iris

ITVs are calculated in accordance with models and other factors authorized by the EPA and specified in Rule 15A NCAC 02B .0208.

ITVs are used in DEQ regulatory programs for calculating water quality-based effluent limits (WQBELs) for NPDES wastewater permitting and establishing benchmark monitoring values for NPDES industrial stormwater permitting. Effluent limits are subject to Clean Water Act requirements and NPDES regulations related to anti-backsliding[8]. ITVs are also used as standards by Division of Waste Management programs to ensure that discharges or spills from solid waste, inactive hazardous waste and underground storage tank sites do not violate surface water quality standards. Note that there is an existing groundwater quality standard for 1,4-dioxane in Rule 15A NCAC 02L .0202; the groundwater standard falls outside the authority of the Clean Water Act and is not being changed as a result of this rulemaking. A list of ITVs can be found on the DEQ website: https://deq.nc.gov/documents/nc-stdstable-06102019. For the substances addressed in this analysis, 1,4-dioxane is the only substance for which there is an ITV.

6.3 Rationale

DEQ is proposing to codify the current in-stream target values for 1,4-dioxane for all surface waters for the protection of human health through consumption of fish and for all Class WS waters to protect drinking water supplies and fish consumption combined. This proposal is based on several factors: 1) 1,4-dioxane has been identified as a Contaminant of Emerging Concern in North Carolina surface waters, some of which are sources of drinking water; 2) there is considerable public concern about its potential adverse impact on human health; and 3) although 1,4-dioxane is already being regulated via DEQ permitting programs, codification of 1,4-dioxane as a standard will allow water bodies to be assessed and, if appropriate, listed as impaired. This can ultimately lead to the development of TMDLs that compel broader regulatory protections and corrective actions.

1,4-dioxane is a synthetic industrial chemical that was historically used as a stabilizer of chlorinated solvents in the manufacture of chemicals and as a laboratory reagent. It is also found as a by-product in some personal care products, laundry detergents, paint strippers, dyes, greases, and antifreeze. It is used as a purifying agent in the manufacture of pharmaceuticals, and it is a byproduct in the manufacture of PET plastic.

1,4-dioxane can enter the environment where it is produced or used as a solvent. It is of particular concern in surface water because it is very stable and does not degrade rapidly over time. Human exposure to 1,4-dioxane in surface waters can occur by drinking water obtained from contaminated surface water supplies and through consumption of fish caught in contaminated surface waters.[9]

[8] https://www3.epa.gov/npdes/pubs/pwm_chapt_07.pdf
[9] https://www.atsdr.cdc.gov/toxfaqs/tfacts187.pdf

The EPA has classified 1,4-dioxane as a likely human carcinogen.[10] Low level exposure to 1,4-dioxane over a person's lifetime can increase the risk of cancer. Higher exposures over a shorter amount of time can damage cells in the liver and kidney. This damage limits the ability of those organs to work properly.

In October 2014, DWR initiated a study[11] of 1,4-dioxane in waters of the Cape Fear River Basin with the objective of identifying potential sources, understanding changes in concentrations, and collecting data to aid in the development of a rulemaking strategy. Results from the study's first year indicated four primary areas of elevated 1,4-dioxane in the upper portion of the Cape Fear River basin. Three of these areas were located immediately downstream of wastewater treatment plants, indicating that discharges from these facilities may be conduits for 1,4-dioxane. The fourth was located further downstream from a treatment plant, so potential local sources will also be explored as the study continues.

Potential sources of 1,4-dioxane the study is examining include:

- Domestic and industrial point-source discharges;
- Active and inactive hazardous waste facilities;
- Active and inactive landfills;
- Pre-regulatory landfills;
- Known 1,4-dioxane contaminated groundwater plumes;
- Wastewater outfalls from groundwater remediation sites;
- Permitted non-discharge facilities;
- Airports;
- Brownfields; and
- Manufactured gas plants.

One of the preliminary conclusions from the study is that the most significant contributions of 1,4-dioxane to ambient surface water concentrations were coming from wastewater effluent originating from sources upstream of wastewater treatment facilities. It was concluded that 1,4-dioxane is likely being discharged into industrial waste streams and passing through treatment facilities which have treatment processes with varying levels of removal efficiency prior to entering surface waters. DEQ continues to examine the Cape Fear River Basin and has begun similar studies in the Neuse and Yadkin River Basins.

6.4 Anticipated Impacts (1,4-dioxane)

Upon completion of the triennial review process, the 1,4-dioxane standard will apply to all freshwaters of the state with a lower value applied to waters used as public water supplies. Anticipated impacts to affected parties are discussed in the following sub-sections.

6.4.1 NPDES Wastewater Dischargers

[10] https://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0326tr.pdf
[11] https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/1-4-dioxane

The proposed standards for 1,4-dioxane will replace the existing ITVs and continue to be implemented through a subset of individual National Pollutant Elimination System (NPDES) wastewater permits as water-quality based effluent limits (WQBELs). The codification of the 1,4-dioxane standard will not alter the approach to setting permit limits for this parameter: water quality-based limits will continue to be based on Reasonable Potential Analyses. Nor will it result in any additional costs associated with monitoring since facilities with individual permits are already conducting effluent monitoring for 1,4-dioxane as required in their permits. It is worth noting that there could be future impacts to NPDES wastewater dischargers if waterbodies are assessed as impaired for 1,4-dioxane, resulting in the development of a TMDL compliance strategy that places additional requirements on dischargers. It is likely such requirements would be implemented through rule. Costs associated with carrying out the TMDL would be accounted for at the time of rulemaking.

NPDES wastewater staff reported that there are no general permits that require monitoring or have limits for 1,4-dioxane. They also reported that, of the approximate total 1,094 active individual NPDES wastewater permits (includes 114 pretreatment programs), there are a total of **18 active individual permits** which have either limits or monitoring requirements for 1,4-dioxane. Note that for purposes of this analysis, we make the conservative assumption that all limits are water quality based (WQBELs) and not technology based (TBELS). This means that the actual number of permits potentially impacted by changes to the standard is likely lower than reported here. Of those 18 permits, only 1 has limits; the remaining 17 have monitoring only. There is an additional permit for a municipal POTW that is currently in draft form that will convert an existing 'monitoring only' requirement to a 'limit.' A list of facilities with 1,4-dioxane requirements is included in Appendix II.

As discussed in Section 6.3, 1,4-dioxane is an emerging contaminant of concern in North Carolina, so it is not surprising that relatively few NPDES permits currently have requirements for 1,4-dioxane. North Carolina began adding 1,4-dioxane monitoring requirements to NPDES permits in 2018; as such, there is not a long history of water quality data on which to base a WQBEL. Because of the potential impacts to human health, it seems likely that monitoring requirements will be added to additional NPDES permits at renewal. We do not have data at this point to suggest whether or not WQBELS are likely to be added to a significant number of permits in the future. These permit modifications would occur whether or not the existing 1,4-dioxane ITV is codified.

NPDES staff anticipate that if WQBELS for 1,4-dioxane are incorporated into more permits, schedules of compliance (SOCs) will also be incorporated. SOCs allow permitted facilities a prescribed time to get their treatment system into operation and capable of meeting water quality standards (via permit limits). SOC timelines are typically five years or fewer (within one permit cycle). Staff anticipate SOCs will be common due to the high cost of treatment technology. As 1,4-dioxane is an emerging contaminant of concern,

municipal water and wastewater treatment facilities are generally not equipped to remove it through their treatment processes. Due to the high aqueous solubility and resistance of 1,4-dioxane to biodegradation, conventional treatment processes are generally ineffective at removal[12]. Installation and operation of advanced treatment processes, such as those using hydrogen peroxide, ozone and/or ultra-violet photo-oxidation -- all known to be effective for 1,4-dioxane removal at either wastewater treatment facilities or drinking water systems -- are anticipated to be prohibitively expensive for local governments and the citizens served by public utilities (*Ibid*). Therefore, the most prudent approaches to reducing 1,4-dioxane concentrations in surface water and drinking water are likely to be reduction, elimination and/or capture and treatment at industrial sources using or generating 1,4-dioxane, if possible.

The single NPDES permit that currently has 1,4-dioxane limits is an automotive products manufacturer. Its permit limit for 1,4-dioxane is 80 ug/L, which is equivalent to the ITV and proposed standard for non-WS waters.

Of the 17 permits that require monitoring of 1,4-dioxane but do not have limits:

- 6 are publicly-owned treatment works (POTWs);
- 3 are chemical manufacturers;
- 2 are groundwater remediation sites;
- 1 is a nuclear fuel manufacturer;
- 1 is an industrial and commercial WWTP with multiple types of waste streams;
- 2 are synthetic fiber and materials manufacturers;
- 1 is a biomanufacturer; and
- 1 is a fiber optics manufacturer.

Compared to the regulatory baseline for 1,4-dioxane – which is comprised of the existing in-stream target values -- there should not be additional costs to existing or future NPDES wastewater permittees and no change in health and environmental benefits as a direct result of the codification of the ITVs into the NC administrative code. The proposed rule will reflect the requirements and processes already being enforced. For this reason, we did not attempt to monetize costs or benefits for 1,4-dioxane. However, it is worth acknowledging that the *ongoing* costs and benefits associated with the monitoring and treatment of 1,4-dioxane are likely to be considerable. Unfortunately, we have very limited data upon which to expand on this topic as DEQ began incorporating 1,4-dioxane into permits only recently. There is not yet enough monitoring data to allow for a meaningful examination of water quality trends, or to make predictions about which permittees may be converted from 'monitoring only' to 'limits' or have monitoring requirements removed all together. As of this writing, DEQ is continuing to gather information on costs associated with implementation of 1,4-dioxane ITVs. This data was not available in time to be included in this document. DEQ is also continuing to conduct fish tissue studies in several river basins

[12] Zenker, M.J., Borden, R.C., Barlaz, M.A. 2003. Occurrence and treatment of 1,4-dioxane in aqueous environments. Environmental Engineering Science 20 (5), 423-432. http://online.liebertpub.com/doi/abs/10.1089/109287503768335913

to better understand the distribution of 1,4-dioxane throughout the waters of the state. These types of information will allow for a more robust understanding of the potential total health and environmental benefits and economic costs from monitoring and treatment of this contaminant in the future.

6.4.2 NPDES Industrial Stormwater Dischargers

Stormwater staff with the NC Division of Energy, Mineral and Land Resources (DEMLR) confirmed that there are no NPDES stormwater general permits with 1,4-dioxane monitoring requirements. Staff estimated that there are currently fewer than five NPDES stormwater individual permits that require monitoring for 1,4-dioxane. These facilities are associated with wood preservation and pulping. The stormwater benchmark for these individual permittees is based on in-stream standards for human health exposures, but it is not based directly on the existing ITV for 1,4-dioxane. Staff confirmed that codification of the ITV would not compel them to revise their current benchmark; nor would it require 1,4-dioxane to be added to additional permits. The Stormwater Program could be indirectly affected in the future if waterbodies to which permittees are discharging are listed as impaired for 1,4-dioxane. Should that occur, permitted facilities would be evaluated on a case-by-case basis if there is reason to suspect that legacy pollutants at a particular site are contributing to the impairment. Depending on the outcome of that evaluation, additional stormwater control measures or monitoring could be required. The costs and benefits of these potential stormwater control requirements would be addressed in a separate rulemaking and analysis.

6.4.3 DWR Groundwater Protection Program

Administered by DWR, the Groundwater Protection Program primarily uses the groundwater standards for remediating sites in which hazardous waste was disposed of by injecting it into underground wells, a practice that is now prohibited. The surface water standards are used for classifying the risk level of discharges to surface water intercepts and for monitoring those surface waters during the remediation process. There are very few hazardous waste injection well sites still under DWR oversight. In total, DWR administers about 30 groundwater protection permits, 14 of which are coal ash sites. The most common parameters monitored under these types of permits are nitrates, dissolved solids, chloride, pH, metals and occasionally volatile organics, pesticides, and semi-volatiles. DWR Groundwater Protection staff report that they do not expect any impact from the proposed codification of the 1,4-dioxane ITV on parties regulated under DWR's Groundwater Protection Program. Monitoring of intercepted surface waters at these sites for contaminants of concern will continue to be required regardless of the proposed change, and these sites will continue to be managed so as to prevent violations of the surface water standards.

Similarly, staff with DWR's Non-Discharge program and Animal Feeding Operations program confirmed that they do not anticipate any economic impact to their permittees from the proposed changes to any of the surface water standards, including 1,4-dioxane.

6.4.4 NC Division of Waste Management

The Division of Waste Management (DWM) was contacted for information about the sites they monitor and regulate under multiple programs. Staff reported that they do not anticipate that any of their sites will be impacted by the proposed change to the 1,4-dioxane standard.

- Solid Waste – The Solid Waste program is currently enforcing the ITVs for 1,4-dioxane at their sites; as such they do not expect a financial impact from the proposed change.
- Inactive Hazardous Waste – 1,4-dioxane is monitored in surface water at these sites if 1) it is a known contaminant in the groundwater discharge and it is possible that the discharge could intercept surface waters; or 2) if there is evidence of spillage such that a broader range of testing is warranted. 1,4-dioxane is generally only an analyte at sites with certain chlorinated solvents where it was used as a preservative or where it was used as a known solvent itself. While chlorinated solvents are a common contaminant at these types of sites, staff are not aware of any particular sites where 1,4-dioxane has been found in high enough concentration and in close enough proximity to cause a surface water quality standard violation.
- Underground Storage Tanks – The UST Section reports that they do not test for 1,4-dioxane as it is not expected to be contained in petroleum.
- Hazardous Waste – Hazardous Waste staff report that they have few sites with exceedances of any 02B surface water quality standards. They do not expect an impact from the proposed revisions.

6.4.5 303(d) Impairment and TMDLs

DWR anticipates that the main impact from the proposed codification of the ITVs for 1,4-dioxane will be the possibility for assessment of waterbodies as impaired for 1,4-dioxane under Section 303(d). There are currently no waterbodies listed as impaired for 1,4-dioxane. In the future, waterbodies will be assessed based on the 1,4-dioxane water quality standards. This assessment will be rolled into DWR's existing 303(d) Listing and Delisting Methodology[13] which is the framework used by the DWR to interpret data and information to determine whether a waterbody is meeting water quality standards. Assessment takes place every two years and includes the toxic substances for which there are water quality standards. This will not require additional expenditure, distribution or reallocation of State funds.

Following assessment, it is possible that waterbodies could be listed as impaired for 1,4-dioxane. There would not be direct impacts as a result of the listing itself. The listing of a waterbody as impaired may eventually result in the development of a TMDL. Once approved by the EMC and EPA, the TMDL may require actions to be taken by

[13] https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2020/2020-Listing-Methodology-approved.pdf

stakeholders to reduce inputs of 1,4-dioxane into surface waters. It is likely such requirements would be implemented through rule. Costs and benefits associated with carrying out the TMDL and associated rules would be accounted for at the time of rulemaking.

6.4.6 DWR Ambient Monitoring Program

1,4-dioxane is currently a part of DEQ's developing emerging compounds program and is sampled at stations across several study areas of the state, including the Cape Fear, Neuse, and Yadkin River Basins. DEQ anticipates that sampling locations for 1,4-dioxane could be adapted as needed to provide data for NPDES or other programs that are seeking to identify sources or document reductions. In the future, it may become part of DWR's Ambient Monitoring Program. None of these efforts are a result of the current proposal to codify the 1,4-dioxane standard; as such, there should be no budgetary impact to DEQ.

7. SELENIUM

7.1 Rule Citation

15A NCAC 02B .0211(11)(d) -- Fresh Surface Water Quality Standards for Class C Waters

7.2 Proposed Change

North Carolina has an existing surface water quality standard for selenium in freshwater of 5 ug total recoverable selenium per liter for Class C waters. This water quality standard was adopted by the EMC on October 1, 1989 and is based on EPA's 1987 Ambient Water Quality Criteria for Selenium. DEQ is proposing to replace the existing standard with the following standard composed of four parts -- two of which are based on concentration ("magnitude") of selenium in fish tissue, and two of which are based on concentration of selenium in the water column:

Table 3: Proposed standard for selenium (dissolved, chronic)

Component		Magnitude	Duration
Fish tissue	Fish egg/ ovary tissue	15.1 mg/kg	Instantaneous
	Fish whole body or muscle tissue	8.5 mg/kg whole body	Instantaneous
		11.3 mg/kg muscle	Instantaneous
Water column	Lentic or Lotic	1.5 ug/l lentic	30-day average
		3.1 ug/l lotic	30-day average

Note that the proposed water column concentrations are expressed as the dissolved fraction rather than total recoverable concentration. Selenium will be measured as total dissolved selenium for water column criteria (samples are to be filtered prior to analysis). The revised standard will also consist of a different concentration depending on whether selenium is measured in "lentic" or "lotic" waters.

7.3 Rationale

DEQ is proposing to update the current water quality standard for selenium by adopting EPA's Aquatic Life Ambient Water Quality Criteria for Selenium (Freshwater) – 2016[14] as a water quality standard for Class C surface waters for the protection of aquatic life. This proposal is based on two factors: 1) North Carolina's current water quality standard to protect aquatic life from the toxic effects of selenium is based on older science and does not account for increased scientific understanding of the bioaccumulation of selenium in the aquatic food chain, and 2) particular concern about impacts from coal ash storage ponds and coal-fired power plants which are located throughout North Carolina and have the potential to increase anthropogenic loading of concentrated selenium in surface waters. In North Carolina, selenium has been found in high levels in the tissues of fish in lakes that receive effluents from power plants.[15]

Selenium is a naturally-occurring metal that is present in sedimentary rocks, shales, coal and sulfur deposits and soils[16]. It can enter surface waters from both weathering of geologic sources and human activity such as from mining, coal-fired power plants, irrigated agricultural applications (soil amendment), and industrial processes related to the manufacture of energy-efficient windows, thin-film photovoltaic cells[17], electronics, and pigments. Selenium, while essential for animals in small amounts, is of special concern due to its potential to bioaccumulate in the aquatic food chain and cause reproduction impairments in aquatic species and waterfowl[18].

Increased scientific understanding of the bioaccumulation of selenium in the aquatic food chain has led to a reevaluation of the previous 1987 EPA recommended criterion of 5 ug total selenium per liter. Selenium is bioaccumulative, meaning that aquatic organisms accumulate this metal in their bodies. The metal can reach concentrations in aquatic organisms that result in adverse impacts to the animals themselves and their offspring (egg development, embryo development, and offspring survival).

Per EPA's 2016 guidelines, a new four-part criterion is recommended that will protect aquatic life from both direct exposures to selenium in the water column as well as accumulated exposure from food sources. This new criterion is arranged in a hierarchical order of preference with the chronic

[14] https://www.epa.gov/wqc/aquatic-life-criterion-selenium
[15] Jessica E. Brandt, Emily S. Bernhardt, Gary S. Dwyer, Richard T. Di Giulio. Selenium Ecotoxicology in Freshwater Lakes Receiving Coal Combustion Residual Effluents: A North Carolina Example. *Environmental Science & Technology*, 2017; Vol. 51, Issue 4
[16] https://mrdata.usgs.gov/geochem/doc/averages/se/east-central.html
[17] https://pubs.usgs.gov/pp/1802/q/pp1802q.pdf
[18] https://www.epa.gov/sites/production/files/2016-06/documents/se_2016_fact_sheet_final.pdf

egg/ovarian tissue criterion taking priority (when available) followed by chronic whole fish or fish muscle (when available) and, finally, by the chronic water column criteria.

The proposed standard is expressed as the dissolved fraction rather than total recoverable metals concentration. The term "total recoverable metals" accounts for all measurable metals, dissolved and particulate, present in a water sample. The dissolved fraction is believed to more closely estimate the portion of the metal that is toxic to aquatic life. The change from total recoverable to dissolved for metals analysis was adopted by the EMC more broadly in 2015; impacts due to that change were accounted for in that Triennial Review's associated fiscal analysis.[19]

[19] https://files.nc.gov/ncosbm/documents/files/DENR10082014.pdf

7.4 Anticipated Impacts (Selenium)

Upon completion of the triennial review process, the revised selenium standard will apply to all freshwaters of the state. Anticipated impacts to affected parties as well as to the environment are discussed in the following sub-sections.

7.4.1 NPDES Wastewater Dischargers

The proposed standard for selenium will be implemented through a subset of individual National Pollutant Elimination System (NPDES) wastewater permits as water-quality based effluent limits (WQBELs). Numeric surface water standards are the primary basis for setting water quality-based effluent limitations for metals in wastewater permits. Changes to the standards can have a significant, if indirect, effect on wastewater dischargers. They can lead to changes in permitted effluent limits and monitoring requirements. Changes to standards that result in more stringent limits or monitoring can make it necessary for dischargers to make capital improvements, operational modifications, or other measures to stay in compliance with their permits. It follows that changes to standards that result in less stringent limits or monitoring can produce cost savings in these same areas.

Changes to permits would be applied to existing permits either at time of renewal (or earlier in cases where a permittee requests a permit modification) or to new permits upon issuance. The nature and extent of the impacts on a particular discharger depend on multiple factors such as the type of wastewater, characteristics of the discharge, and characteristics of the receiving water. The measures required to meet revised effluent limits – and the economic costs or savings of those measures – are, in turn, specific to each affected discharger.

The proposed change to the selenium standard will not alter the approach to setting permit limits for this metal: water quality-based limits will continue to be based on Reasonable Potential Analyses (RPA). An RPA is done with the issuance of every NPDES wastewater permit to determine if a discharger has reasonable potential to cause an exceedance of standards in its receiving stream if its maximum predicted effluent concentration (MPEC) is greater than its maximum allowable effluent concentration (MAEC).

> MPEC = Maximum Predicted Effluent Concentration (total recoverable) of a metal in a wastewater discharge, as determined by a statistical evaluation of actual, current monitoring data for that discharge.
>
> MAEC = Maximum Allowable Effluent Concentration of a metal, expressed as total recoverable metal, that will not cause an exceedance of the applicable water quality standard in the stream for a specific discharge and its receiving stream.

Selenium is a challenging -- and often expensive -- metal to remove from water. In this regard, it is most similar to mercury. Selenium and mercury are unique in that they tend to stay in dissolved form in water. Other metals have a greater tendency to bind to particles and are therefore easier to remove using much less expensive chemical precipitation technologies. In order to effectively remove selenium from water, costly technologies such as bioreactors or zero-liquid discharge systems are required. Bioreactors are effective at removing selenium (and mercury), but not other metals. Zero-liquid discharge systems, on the other hand, are effective at removing other metals as well, but those systems are significantly more expensive than bioreactors. In North Carolina, there is currently only one zero-liquid discharge system. It was installed at a coal-fired power plant at the cost of about $120 million, according to NPDES staff. These systems have an additional advantage in that their waste products are salts and other solids that can generally be disposed of in a conventional landfill.

NPDES wastewater staff reported that there are no general permits that require monitoring or have limits for selenium. They reported that of the approximate total **1,094** active individual NPDES wastewater permits, there are **35** active individual permits which have either limits or monitoring requirements for selenium. Of those 35 permits, 20 have limits and 15 have monitoring only. Note that for purposes of this analysis, we make the assumption that all limits are water quality based (rather than technology based) except in cases where we have been able to verify TBELS for a given parameter. Due to time and staffing constraints, we were unable to examine each permit on an individual basis to ascertain whether each of its limits is water quality or technology based. A list of facilities with selenium requirements is included in Appendix III.

Of the 20 permits that have selenium limits:

- 10 are power plants;
- 3 are publicly-owned treatment works (POTWs);
- 2 are chemical manufacturers;
- 2 are industrial and commercial WWTPs with multiple types of waste streams;
- 2 are groundwater remediation sites; and
- 1 is a phosphate mine.

Of the 15 permits that require monitoring of selenium but do not have limits:

- 5 are power plants (1 publicly-owned; 4 privately-owned);
- 4 are POTWs;
- 2 are chemical manufacturers;
- 1 is a municipal water treatment plant (reverse osmosis);
- 1 is a fiberglass manufacturer;
- 1 is a pulp and paper mill; and
- 1 is composite fiber and materials manufacturer.

To get an idea of whether the change to the selenium standard is likely to have a significant effect on permit limits, NPDES wastewater staff performed reasonable potential analyses (RPAs) on a subset of permits that currently require monitoring for selenium (Table 4).

These particular permits were chosen because they are known to have relatively high levels of selenium in their wastewater and can be considered a worst-case scenario for purposes of this analysis. Staff examined reported selenium monitoring data from six power plant facilities and compared that data to the projected limits, using a conservative translator factor of 1.0 to convert the proposed standard from dissolved selenium to total recoverable selenium (translator of 1.0 assumes 100% of sample is dissolved fraction). All analyses were done using the proposed water column standards (rather than fish tissue standards) because fish tissue data was not available. Note that all six of these facilities currently have technology-based limits on the internal outfall; none have a water-quality based limit on the external outfall.

Table 4: Results of Reasonable Potential Analyses using Proposed Water Column Selenium Standards for Six Power Plants

	Facility #1	**Facility #2**	**Facility #3**	**Facility #4**	**Facility #5**	**Facility #6**
Current limit (ug/L, total)	None*	None*	None*	None*	None*	None*
Proposed WQ Std (ug/L, total)	1.5	3.1	3.1	3.1	3.1	1.5
Estimated MAEC (ug/L, total)	1.50000	40.98000	57.38571	27.10000	32.19091	1.50000
Estimated MPEC (ug/L, total)	4.13400	42.30000	14.78100	13.16000	11.13000	0.89307
# Reported Values** >MAEC	29/36	1/58	0/2	0/1	0/43	0/58
% MPEC/MAEC * 100	276%	103%	26%	48%	35%	59%
Change to Permit	New WQ limit likely	New WQ limit unlikely	No change	No change	No change	No change

* Facility has a technology-based limit on the internal outfall, but it does not currently have a limit on the external outfall.

** excludes non-detects.

MPEC = Maximum Predicted Effluent Concentration (total recoverable) of a metal in a wastewater discharge, as determined by a statistical evaluation of actual, current monitoring data for that discharge.

MAEC = Maximum Allowable Effluent Concentration of a metal, expressed as total recoverable metal, that will not cause an exceedance of the applicable water quality standard in the stream for a specific discharge and its receiving stream.

Using the results of the RPA's and projected selenium allowable concentrations, staff concluded that the change to the standard may result in new WQBELs for two of the six permits and no change to the remaining four permits.

Facility #2 (Rogers Energy Complex) had only one reported value that exceeded the estimated MAEC. It is less likely they would exceed the MAEC and receive a WQBEL if the translator factor used in the RPA was less than 1.0. To date, staff have not derived the appropriate translator factor for selenium, but we can assume it will be less than 1.0. For this reason, we think it's reasonable to assume that Facility #2 will not exceed the MAEC and, therefore, will not receive a WQBEL for selenium. It is also of note that this facility currently has a schedule of compliance that allows them through the end of 2023 to comply with their technology-based limits, so it is possible they are already taking actions that will further reduce selenium concentration in their discharge.

For Facility #1 (Roxboro Steam Electric Power Plant), the results of the RPA suggest the addition of WQBELs for selenium would be appropriate. Based on our understanding of this facility's closure plan and expected permit renewal date, however, we assume that the proposed selenium standard will never be applied to this permit. According to the Duke 2019 Integrated Resource Plan, this facility's four coal ash units are planned for retirement: two units retired by December 2028; two units retired by December 2033. These dates could be shifted earlier or later, but we do not expect them to deviate from this schedule enough to affect permitting decisions.

The current permit for Facility #1 was renewed effective July 1, 2020. This means that the earliest the new selenium standard could be incorporated into their permit would be July 1, 2025 -- the earliest their permit would be due for renewal. By 2025, their operations will be substantially reduced due to ongoing activities related to planned closures. We presume that this decrease in operations will reduce the risk of discharging selenium into surface waters in excess of their permit limits. The imposition of new selenium reduction requirements at renewal is unlikely due to this presumed decrease in risk to water quality and also due to the time and expense that would be required to plan, design, and install new treatment technology. The time they would be allowed to achieve compliance with the new standard (one to two permit cycles) is likely to extend beyond this facility's operations.

After the closure of the coal ash units at Facility #1, there will be some coal ash remaining at their permitted on-site landfill. Groundwater monitoring, among other protective measures, will be incorporated into their permit at that point, and effluent limits will no longer be needed.

For these reasons, it is our best estimate that there will be no impact on Facility #1 from the adoption of the proposed selenium standard.

In the unlikely event that this facility is required to comply with the proposed selenium standard, NPDES wastewater staff stated they would face significant hurdles to meeting the estimated water-quality based limit. This facility is already equipped with physical-chemical and biological treatment systems, so further reducing selenium in their discharge could require upgrading to an even more expensive zero-liquid discharge system. Based on experience of NPDES staff and limited studies found through web searches, the installed cost of a zero-liquid discharge system is estimated between $15 million and $600 million. Installed cost includes equipment, engineering, design, installation, and startup costs. Among other variables, the cost for a facility is heavily dependent on flow rate (gallons per minute) and the level of contaminants relative to the target limit. This particular facility is expected to fall towards the high end of the cost range due to its high wastewater flow rate. We assume capital expenditures would occur over about a ten-year period (two permit cycles) to provide time for the facility to budget, design and construct the treatment system. Beyond the initial capital expenditures, there would be ongoing costs associated with operation and maintenance. This cost information is provided solely for illustrative purposes. As stated earlier, we assume that the proposed selenium limit will never be incorporated into this facility's NPDES permit; as such, there will be no impact from its adoption.

Under their current permit, this permittee has recently begun collecting fish tissue from Hyco Lake for monitoring of selenium. This facility discharges to a lentic waterbody, which means that the water residence time is likely longer than in a lotic waterbody. According to EPA, organisms in waters with long residence times will tend to bioaccumulate more selenium than those living in waters with shorter water residence times. It follows that waters with longer residence times are more likely to exhibit selenium toxicity near the selenium sources as compared to flowing waters where selenium toxicity may appear only downstream of the selenium sources.[20] So while selenium concentrations from fish tissue collected near the discharge for this permittee would provide the most direct measure of selenium toxicity, we cannot say whether fish tissue concentrations will be lower, higher, or equivalent relative to the water column concentrations. Fish tissue data for this facility is not yet available for review.

In 2017, DEQ collected fish tissue samples to analyze for selenium at ambient monitoring and RAMS stations. Of approximately 290 fish tissue samples collected around the state, 20 were collected from Hyco Lake. Of the 290 samples analyzed, only one exceeded the proposed fish tissue standard. That exceedance was from a Redear sunfish fillet collected from Hyco Lake. None of the water column samples collected from Hyco Lake returned exceedances of the proposed selenium standard for lentic waterbodies. The other fish tissue samples from Hyco Lake did not exceed the standard, but they did tend to be markedly high relative to fish tissue collected from riverine waterbodies.

[20] EPA Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater 2016

NPDES wastewater staff also performed RPAs on the two groundwater remediation sites that discharge to surface waters and have WQBELs for selenium. One is a multi-family housing complex that is permitted to discharge treated groundwater from excavations via storm sewer to an unnamed tributary in Durham County. Note that this permit also has limits for mercury, total cadmium, and other metals. The other site is a former pickle brinery in Robeson County, which also has limits for mercury and other metals (but not cadmium). The current permitted chronic (monthly average) limit for both of these facilities is 5.0 ug/L. Under the proposed standard for lotic waters, the dissolved limit for both would be 3.1 ug/L. Using the same translator of 1.0, the maximum predicted effluent concentrations (MPECs) would be 10.9 ug/L for the brinery and 6.8 ug/L for the housing complex. Based on these results, it is likely that both sites will continue to have reasonable potential to exceed water quality standards and will continue to have WQBELs.

Due to data uncertainties, we could not make determinations as to whether the two groundwater remediation sites would be significantly more likely to exceed WQBELs based on a lower water quality standard. A significant portion of the monitoring data used in the RPAs was reported as "<10 ug/L," which was assumed to be 10 ug/L for purposes of WQBEL calculations. Without more sensitive selenium concentration data, we cannot predict how much of an effect the revised standard will have on their WQBELs. We do know, however, that NPDES staff have determined that both sites have reasonable potential to exceed current water quality standards as evidenced by the fact that they already have WQBELs, and one site has a schedule of compliance through November 2024. In both cases, they are already taking measures to reduce metals concentrations in their discharges.

Because of the uncertainty about the degree to which the two groundwater remediation sites are exceeding their current WQBELs, we cannot predict whether or not they will be required to change their operations as a result of the revised standard. Consequently, we cannot predict whether they will be subject to additional costs. If the changes to the standard do require operational changes for one or both groundwater remediation sites, such changes will be on a much smaller scale than the power plant facility discussed earlier in this section as their discharge flows (MGD) are orders of magnitude lower than the power plant facility. The most likely actions that these permittees would take is to request that their certified laboratories report metals analyses at the practical quantitation limit (PQL) so that subsequent RPAs can clearly indicate whether limits are warranted. There should be no additional costs associated with reporting analytical results to the PQL for selenium.

We focused our analysis of the impacts of the selenium standard change on those wastewater permits we expect to have the highest levels of selenium in their discharges and can therefore be considered most likely to exceed water quality limits. Of those permits, six are not expected to be significantly impacted and two are inconclusive. While there are unknown variables that could result in different outcomes at the time of permit renewal, we believe it is reasonable to assume that the majority of the remaining existing and future permits may be required to adjust existing selenium limits, but that the adjustment will not

result in a significant increase in the number of permits violating their selenium limit. Similarly, we do not have data to suggest that selenium WQBELs will be added to most permits as a result of the change. For purposes of this analysis, we do not expect a significant economic impact on the majority of NPDES permits with selenium requirements, so we have not attempted to monetize impacts.

NPDES wastewater permit limits are required by regulation to be expressed as "total recoverable." For this reason, water column data – not fish tissue data -- will continue to be used for purposes of permitting unless and until a fish tissue parameter is added to a given individual permit. It is of note that some permitted power plant facilities are currently required to do fish tissue sampling in addition to water column sampling. Although a requirement of their permit, the fish tissue data is not yet used in establishing limits or compliance. Rather, the fish tissue data is used to provide additional information. The addition of the fish tissue component to the water quality standard will not impose any new requirements on permittees.

Similarly, permittees are not expected to incur additional costs as a result of the change from total recoverable to the dissolved fraction. The change from total recoverable to dissolved for metals analysis was adopted more broadly by the EMC in 2015; impacts due to that change were accounted for in that Triennial Review's associated fiscal analysis (*Ibid*).

7.4.2 NPDES Industrial Stormwater Dischargers

Stormwater staff with the NC Division of Energy, Mineral and Land Resources confirmed that there are no NPDES stormwater general permits with selenium monitoring requirements. Staff estimated that there are currently fewer than 20 NPDES stormwater individual permits that require monitoring for selenium. These facilities are associated with coal-fired power generation. The stormwater benchmark for these individual permittees is based on acute exposure; as such, it is not comparable to either the existing or proposed selenium standard, both of which are based on chronic exposure. It follows that there will be no impact to the stormwater benchmark or permittees with the adoption of the proposed chronic selenium standard.

7.4.3 DWR Groundwater Protection Program

Of the approximately 30 groundwater protection permits administered by DWR, we were unable to determine which, if any, of these sites require monitoring for selenium. DWR Groundwater Protection staff report, however, that the impact of the proposed change to the selenium standard on parties regulated under DWR's Groundwater Protection Program is expected to be negligible. Monitoring of intercepted surface waters at these sites for contaminants of concern will continue to be required regardless of the proposed change, and these sites will continue to be managed so as to prevent violations of the surface water standards.

Similarly, staff with DWR's Non-Discharge and Animal Feeding Operations programs confirmed that they do not anticipate any economic impact to their permittees from the proposed changes to any of the surface water standards, including selenium.

7.4.4 NC Division of Waste Management

The Division of Waste Management (DWM) was contacted for information about the sites they monitor and regulate under multiple programs. Staff reported that they do not anticipate that any of their sites will be impacted by the proposed change to the selenium standard.

- Solid Waste program -- Although selenium is sampled for routinely in surface waters at solid waste sites, it is not the "driver" for cleanup of either groundwater or, indirectly, surface waters.

- Inactive Hazardous Waste program – Selenium is monitored in surface water at these sites if 1) it is a known contaminant in the groundwater discharge and it is possible that the discharge could intercept surface waters; or 2) if there is evidence of spillage such that a broader range of testing is warranted. Staff state that it is rare to have metals in groundwater at concentrations that could impact surface water. They do not know of any sites where selenium is an issue.

- Underground Storage Tank program -- Although not a driver for cleanup at waste oil sites (lead and chromium are the main concern), selenium may be tested for at these sites. Staff report that selenium is not usually detected above regulatory limits, and it is not a driver for cleanup.

- Hazardous Waste – Hazardous Waste staff report that they have few sites with exceedances of any 02B surface water quality standards. They do not expect an impact from the proposed revisions.

7.4.5 Impairment 303(d) and TMDLs

DEQ anticipates that the proposed change to the selenium standard could result in a more accurate assessment of waterbody impairment, primarily from the fish tissue component. Fish tissue data should provide biological information that could be used to confirm a direct impairment to a designated use. Fish tissue alone, or in combination with water column values, may be used to establish use impairment. The addition of fish tissue into the standard will not necessitate the sampling of fish tissue by state programs, and fish tissue values would be used only where they are available.

Unfortunately, the availability of additional fish tissue data is expected to be limited for the foreseeable future. Collection of fish for ovary/egg or whole-body/muscle selenium concentration testing is time- and labor-intensive as compared to water sampling. The Division currently lacks adequate manpower and financial resources to carry out regular fish tissue sampling at ambient monitoring stations. It is likely that fish tissue collection

will be reserved for those waterbodies where it is known that aquatic life is at the greatest risk of exposure. A lack of fish tissue data or the absence of fish from a waterbody will not prevent it from being assessed as impaired if the selenium water concentration criterion is exceeded. It is likely that the water column criterion – rather than the fish tissue criterion -- will continue to apply to the majority of freshwaters of the state. For this reason, we do not anticipate an economic impact from this change, at least for the foreseeable future.

There are currently no waterbodies listed as impaired for selenium. In the future, waterbodies will continue to be assessed for selenium impairment, but those assessments will be based on the revised selenium water quality standards. Assessment for selenium impairment is already accounted for in DWR's 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. Assessment takes place every two years and includes the metals for which there are water quality standards. The addition of the fish tissue component will require the methodology to be updated; however, staff estimate the time to perform this task will be negligible. This will not require additional expenditure, distribution or reallocation of State funds.

Because the proposed water column selenium standards are lower, it is possible that waterbodies would be more likely to be listed as impaired for selenium. There would not be direct impacts as a result of the listing itself. The listing of a waterbody as impaired may eventually result in the development of a TMDL. Once approved by the EMC and EPA, the TMDL may require actions to be taken by stakeholders to reduce inputs of selenium into surface waters. It is likely such requirements would be implemented through rule. Costs and benefits associated with carrying out the TMDL and associated rules would be accounted for at the time of rulemaking.

7.4.6 DWR Ambient Monitoring Program

Selenium is an existing standard for which a DWR ambient monitoring program is already established; as such, there should be no budgetary impact to this program as a result of adopting a revised standard. Selenium will continue to be monitored in surface waters by both DWR and monitoring coalitions as part of the Ambient Monitoring System. Neither the addition of a fish tissue component nor the switch from total recoverable to dissolved selenium will place additional requirements on these programs or require shifting of resources.

8. CADMIUM

8.1 Rule Citations

15A NCAC 02B .0211(11)(e) – Fresh Surface Water Quality Standards for Class C Waters
15A NCAC 02B .0220(9)(c) – Tidal Salt Water Quality Standards for Class SC Waters

8.2 Proposed Changes

North Carolina has existing surface water quality standards for dissolved, hardness-dependent cadmium in freshwater and dissolved cadmium in saltwater (Table 5). These water quality standards were adopted by the EMC on January 1, 2015. They were based on EPA's *2001 Update of Ambient Water Quality Criteria for Cadmium* (EPA-822-R-01-001; April 2001).

Table 5: Existing surface water standards for cadmium

Medium	Standard	Magnitude (ug/L)
Freshwater dissolved, hardness-dependent	Cadmium, acute	WER · [{1.136672-[ln hardness](0.041838)} · e^{0.9151 [ln hardness]-3.1485}]
	Cadmium, acute, trout	WER · [{1.136672-[ln hardness](0.041838)} · e^{0.9151[ln hardness]-3.6236}]
	Cadmium, chronic	WER · [{1.101672-[ln hardness](0.041838)} · e^{0.7998[ln hardness]-4.4451}]
Saltwater dissolved	Cadmium, acute	WER · 40
	Cadmium, chronic	WER · 8.8

WER = Water Effects Ratio
ln = natural logarithm
hardness = the measured water hardness from the collected sample

DEQ is proposing to update the existing cadmium standards with standards based on EPA's *Aquatic Life Ambient Water Quality Criteria for Cadmium – 2016* (EPA-820-R-16-002) (Table 6). As with the 2001 cadmium criteria, the 2016 freshwater criteria are hardness-dependent and the saltwater criteria are not.

Table 6: Proposed surface water standards for cadmium

Medium	Standard	Magnitude (ug/L)
Freshwater dissolved, hardness-dependent	Cadmium, acute	WER · [{1.136672-[ln hardness](0.041838)} · e^{0.9789 [ln hardness]-3.345}]
	Cadmium, acute, trout	WER · [{1.136672-[ln hardness](0.041838)} · e^{0.9789 [ln hardness]-3.866}]
	Cadmium, chronic	WER · [{1.101672-[ln hardness](0.041838)} · e^{0.7977[ln hardness]-3.909}]
Saltwater dissolved	Cadmium, acute	WER · 33
	Cadmium, chronic	WER · 7.9

WER = Water Effects Ratio
ln = natural logarithm (*e*)
hardness = the measured water hardness from the collected sample

Note that the freshwater cadmium standards are not represented simply by one number; rather, they are comprised of equations. These equations are specific to medium (freshwater, saltwater) and designated use (e.g. trout). Additional variables include the water effects ratio (WER) and hardness, which are specific to each sample location. The WER is a multiplier that can be used to

modify the water quality standard to account for proven differences in toxicity between laboratory testing and in-stream conditions. Conditions related to the application of a WER are described in 15A NCAC 02B .0211 and 15A NCAC 02B .0220. A default WER value of one is used in the majority of permits. Water hardness is a laboratory measure of the concentration of dissolved minerals in a water sample. Hardness can vary by sample location and generally contributes more to the variability of calculated standards than does the WER.

For illustrative purposes, the current and proposed standards are shown side by side in Table 7 using an example hardness of 25 mg/L and a WER of 1. For freshwater, the calculated acute criterion for non-trout waters is slightly higher (*less stringent*) than the existing criterion, and the calculated chronic criteria is significantly higher (*less stringent*). The calculated acute criterion for trout waters has been slightly lowered to be protective of the commercially- and recreationally-important rainbow trout (*Oncorhynchus mykiss*). For saltwater, both the calculated acute and chronic criteria are lower (*more stringent*).

Table 7: Existing and proposed Cadmium standards using default hardness of 25 mg/L (freshwater only) and WER of 1

Standard, Medium	Existing Calculated Standard (ug/L)	Proposed Calculated Standard (ug/L)
Acute, freshwater	0.82	0.83 ↑
Acute, trout, freshwater	0.51	0.49 ↓
Acute, saltwater	40	33 ↓
Chronic, freshwater	0.15	0.25 ↑
Chronic, saltwater	8.8	7.9 ↓

8.3 Rationale

DEQ is proposing to update the current water quality standards for cadmium by adopting EPA's *Aquatic Life Ambient Water Quality Criteria for Cadmium – 2016* (EPA-820-R-16-002) as water quality standards for Class C and Class SC surface waters for the protection of aquatic life. This proposal is based on two factors: 1) updated science on the toxic effects of cadmium on aquatic life; and 2) for freshwater, updated science on the relationship between water hardness and toxicity.

Cadmium occurs naturally in low concentrations in surface waters due to weathering of mineral deposits. Industrial uses of cadmium vary, but include the manufacturing of batteries, pigments, plastic stabilizers, metal coatings, alloys, electronics and nanoparticles for solar cells and color displays.[21] Cadmium is a non-essential metal with no biological function in aquatic animals. In addition to acute effects such as mortality, chronic exposure to cadmium can lead to adverse effects on growth, reproduction, immune and endocrine systems, development, and behavior in aquatic organisms (*Ibid*).

[21] https://www.epa.gov/sites/production/files/2016-03/documents/cadmium-final-factsheet.pdf

Per EPA's 2016 guidelines, the updated cadmium criteria will protect aquatic life from direct exposures to dissolved cadmium in the water column for both fresh and salt waters. The measure of dissolved metals accounts for only the portion of cadmium that is dissolved in the water column. It does not account for cadmium that is bound to particulate matter. The continued focus on the dissolved fraction is significant in that it is this portion of the cadmium in the water column that is directly biologically available to aquatic organisms and, therefore, poses the greatest risk for adverse health impacts. In addition, the updated criteria continue to take into account the relationship between toxicity and water hardness (mineral content) that was established in prior EPA National Recommended Water Quality Criteria for freshwater.

8.4 Anticipated Impacts (Cadmium)

Upon completion of the triennial review process the new cadmium standards will apply to all fresh, trout, and tidal waters of the state. Anticipated impacts to affected parties as well as to the environment are discussed in the following sub-sections.

8.4.1 NPDES Wastewater Dischargers

The proposed standard for cadmium will be implemented through a subset of individual NPDES wastewater permits as water-quality based effluent limits (WQBELs). Numeric surface water standards are the primary basis for setting water quality-based effluent limitations for metals in wastewater permits. Changes to the standards can have a significant, if indirect, effect on wastewater dischargers. They can lead to changes in permitted effluent limits and monitoring requirements. Changes to standards that result in more stringent limits or monitoring can make it necessary for dischargers to make capital improvements, operational modifications, or other measures to stay in compliance with their permits. It follows that changes to standards that result in less stringent limits or monitoring can produce cost savings in these same areas.

The nature and extent of the impacts on a particular discharger depend on multiple factors such as the type of wastewater, characteristics of the discharge, and characteristics of the receiving water. The measures required to meet revised effluent limits – and the economic costs or savings of those measures – are, in turn, specific to each affected discharger.

In freshwater, water hardness is an important factor in determining WQBELs because of the relationship between water hardness and toxicity: the lower the hardness, the more toxic cadmium is to aquatic organisms. The relationship between the proposed freshwater standards and water hardness is illustrated in Table 8.

Table 8: Proposed Freshwater Cadmium Standards at Varying Water Hardness			
Hardness (mg CaCO3/L)	Acute, Trout (ug/L)	Acute (ug/L)	Chronic (ug/L)
25	0.49	0.83	0.25
30	0.58	0.98	0.29
35	0.67	1.1	0.33
40	0.76	1.3	0.36
45	0.85	1.4	0.39
50	0.94	1.6	0.43
55	1.0	1.7	0.46
60	1.1	1.9	0.49
65	1.2	2.0	0.52
70	1.3	2.2	0.55
80	1.5	2.5	0.61
90	1.6	2.7	0.66
100	1.8	3.0	0.72
150	2.6	4.4	0.97
200	3.4	5.8	1.2
250	4.2	7.1	1.4
300	5.0	8.4	1.6
350	5.8	9.7	1.8
400	6.5	11	2.0

It is worth noting that unless water hardness data is provided for an outfall, NPDES wastewater permits default to 25 mg/L. If permittees report hardness data, the reported data will be used if the value is between 25 mg/L on the low end and 400 mg/L on the upper end.

The proposed change to the cadmium standard will not alter the approach to setting permit limits for this metal: water quality-based limits will continue to be based on Reasonable Potential Analyses. RPAs are performed in the same way for discharges to freshwater and saltwater. The resulting permit limits often differ, however, because (1) metals exhibit different degrees of toxicity upon species native to the two environments and (2) IWC is determined differently in free running streams and tidal waters. By default, the Division assumes an IWC of 100% (zero dilution) in tidal waters, meaning that effluent limitations for metals of concern will be set equal to the numeric standards.

The proposed change will not result in any additional costs associated with monitoring since facilities with individual permits are already conducting effluent monitoring for

cadmium as required in their permits. Permit changes to incorporate the revised standard would be applied to existing permits either at time of renewal (or earlier in cases where a permittee requests a permit modification) or to new permits upon issuance.

NPDES wastewater staff reported that there are no general permits that require monitoring or have limits for cadmium. They reported that of the approximate total **1,094** active individual NPDES wastewater permits, there are a total of 47 active individual permits which have either limits or monitoring requirements for cadmium. Of those 47 permits, 20 have limits and 27 have monitoring only. Note that for purposes of this analysis, we make the assumption that all limits are water quality based (rather than technology based) except in cases where we have been able to verify TBELs for a given parameter. Due to time and staffing constraints, we were unable to examine each permit on an individual basis to ascertain whether each of its limits is water quality or technology based. A list of permitted facilities with cadmium requirements is included in Appendix IV.

Of the 20 permits that have cadmium limits:

- 8 are publicly-owned treatment works (POTWs);
- 4 are industrial and commercial WWTPs with multiple types of waste streams;
- 3 are power plants;
- 2 are metals manufacturers;
- 2 are electronics manufacturers; and
- 1 is a chemical manufacturer.

Of the 27 permits that require monitoring of cadmium but do not have limits:

- 12 are power plants (1 publicly-owned; 11 privately-owned);
- 10 are POTWs;
- 3 are chemical manufacturers;
- 1 is a water treatment plant remediation site; and
- 1 is a Brownfields site.

To get an idea of whether the changes to the cadmium standard are likely to have a significant effect on permit limits, NPDES wastewater staff performed reasonable potential analyses (RPAs) on a subset of permits that currently have limits or require monitoring for cadmium (Table 10). We focused our evaluation on nine existing permits that represent a variety of categories relevant to this analysis:

- saltwater and freshwater;
- trout and non-trout waters;
- private-owned versus public-owned;
- various industry types; and
- with and without cadmium limits.

All nine permits have either been issued or renewed since the dissolved cadmium criteria were adopted in 2015. It is of note that in the universe of NPDES wastewater permits, we identified only one permitted facility with cadmium requirements that discharges to trout waters and one that discharges to saltwaters; as such, staff ran RPAs for all permits within

those two subgroups. Staff also ran an RPA on a groundwater remediation site for which cadmium limits had, until recently, been included in its permit. Results of the projected RPAs are shown in Table 9.

Table 9: Results of Reasonable Potential Analyses* based on Proposed Cadmium Standards for Nine NPDES Facilities

Permit #	Rec'g water class	Outfall #	L/M	Hard-ness mg/L	Current limit ug/L, Total	Est. MAEC ug/L, Total	Est. MPEC ug/L, Total	% MPEC/ MAEC x 100
NC0000311 *Metals mfr*	B-tr; HQW	001	L	25	260 C 690 A	291.6 C 1,319.5 A	7.400	2.5% C 0.56% A **No RP**
NC0001228 *Nuclear fuel mfr*	C,Sw; HQW (PNA)	001	L	31.1	0.15 lbs/d C; 0.82 lbs/d A	30.8 C 147.6 A	5.182	17% C 4% A **No RP**
NC0001881 *Metals mfr*	SC,Sw NSW	001	L	N/A	8.9 C 40.2 A	8.9 C 40.2 A	1.000	11% C 2.5% A **No RP**
NC0024244 *POTW*	C	001	L	46.4	2.2 – 1.1 C 16 – 6.5 A *SOC ranges*	1.03 C 5.9 A	20.000	1,943% C 335% A **RP shown**
NC0038377 *Power Plant*	C	002	L	25	0.59 C 3.24 A	0.59 C 3.24 A	0.880	150% C 27% A **RP shown,** only one value > MAEC
NC0089702** *Groundwater remediation*	WS-V; NSW	unk	L*	25	0.15 C 0.82 A	1.7 C 10.8 A	0.665	39% C 6% A **No RP**
NC0056863 *POTW*	C;Sw	001	M	144.1	N/A	2.2 C 14.9 A	10.750	486% C 72% A **RP shown**
NC0026689 *POTW*	C	001	M	56.3	N/A	1.089 C 6.575 A	1.000	92% C 15% A **No RP**; **monitor still required**
NC0003760 *Chemical mfr*	C	001	M	31.2	N/A	253.8 C 1159.9 A	1.550	0.61% C 0.13% A **No RP**
	C	002	M	25	N/A	624.1 C 2778.7 A	3.050	0.49% C 0.11% A **No RP**
	C	003	M	34.1	N/A	0.74 C 4.24 A	1.060	142% C 25% A **RP shown**

* Note: Reasonable potential analyses (RPAs) used maximum monthly average over previous 36 months for flow (rather than the permitted flow) and DMR data for cadmium and hardness for the previous 4.5 years. Using the permitted flow in the RPAs may change the results.

** Limits for cadmium were removed from this permit in 2020 based on RPA using reported Cd data w/ highest value below detection limits.

MAEC = Maximum Allowable Effluent Concentration of a metal, expressed as total recoverable metal, that will not cause an exceedance of the applicable water quality standard in the stream for a specific discharge and its receiving stream.

MPEC = Maximum Predicted Effluent Concentration (total recoverable) of a metal in a wastewater discharge, as determined by a statistical evaluation of actual, current monitoring data for that discharge.

MPEC/MAEC x 100 = If < 50%, NPDES staff will use BPJ on case-by-case basis to determine if monitoring should be required.

C = Chronic; A = Acute L = Limit; M = Monitoring RP = Reasonable potential to exceed water quality standard

Based on the results of the nine RPAs, staff reached the following (heavily qualified) conclusions:

- It is likely that a significant percentage of permits with cadmium limits will have their WQBELs adjusted because of the revised cadmium standard. Table 9 shows that four of the six permits with limits would potentially adjust their WQBELs due to the revised cadmium standard. With that being said, there are unknown variables specific to each permit that could result in a different outcome at the time of permit renewal.

- **Non-trout Freshwater**
  The subgroup most likely to realize regulatory relief from the revised cadmium standard are the 46 permits that discharge to non-trout freshwater. The chronic standard is typically the more stringent standard and therefore should account for most of the cost savings. Of the 9 permits examined, 4 have limits and discharge to non-trout freshwater. Of these 4, it appears that one permit (NC0001228) could potentially be eligible for relief from their cadmium limit. This is qualified by the fact that we do not have information about whether they may already be eligible for relief. We suspect this is the case, however, because the estimated MPEC (7.4) for this permit is quite low relative to the MAEC (291.6). For purposes of this analysis, however, we assume that the change to the cadmium standard will result in significant change to the WQBEL such that they will be relieved of the limit (but will continue monitoring). Expanding this to the entire body of permits with cadmium limits, we assume that the change to the cadmium standard will allow one of every four permits (25%) to be relieved of WQBELs but continue monitoring.

  Table 10 summarizes estimated potential benefits to NPDES wastewater permittees with cadmium limits that discharge to non-trout freshwater. Only privately-owned and local government-owned facilities are potentially affected. The estimates project benefits over two five-year permit cycles, although it is possible facilities will continue to realize benefits beyond ten years. The majority of savings are likely to be in the form of avoided costs associated with reduced operation and maintenance (O&M) costs and assumes facilities use chemical precipitation with secondary clarification. Cost savings could be higher if facilities are currently

using more sophisticated treatment technologies to reduce cadmium. Alternatively, cost savings could be lower if facilities must continue to operate the same level of treatment in order to reduce other metals not affected by this rulemaking. Cost savings estimates are derived from the fiscal analysis for the 2014 Triennial Review (Privately-owned/Industrial: P. 70, Section VIII, Subsection 5.4; Local-government owned/POTWs:Table III.B-9).[22] The 2014 analysis assumed that the addition (and conversely, the removal) of limits for a particular metal would have the same impact as for any other metal and result in the same fiscal impact on the discharger. Estimates include savings on annual operating costs, chemical costs, and electricity costs. Capital costs were excluded from the current analysis since it is presumed that such expenditures have already been made and will not be recouped as a result of eliminating WQBELs.

Table 10: Estimated Benefits (Avoided Costs) to NPDES Wastewater Dischargers from Changes to Cadmium Standard over 10 Years (in $Millions)
Impact: WQBELs convert to Monitoring-Only

	Privately-owned[2]	Local Government-owned[3]
Cost per year ($M)	$0.0454	$0.107
# Years	10	10
Total cost per Facility, 10 yrs ($M)	$0.454	$1.07
# Facilities Impacted	3 *(25% of 12)*	2 *(25% of 8)*
Total Avoided Costs NPV[1], 10 Yrs ($M)	**$1.59**	**$1.67**

[1] Net Present Value (NPV) computed at 7% discount rate, adjusted from 2010/2014 to 2021 dollars.
[2] Assumes average permitted flow of 1.4 MGD.
[3] Assumes average daily capacity of 6.82 MGD.

It is possible that some permits with monitoring-only requirements for cadmium could be relieved of their monitoring requirements because of the higher non-trout freshwater cadmium standard. With that being said, our analysis does not clearly indicate a causal relationship between the change to the standard and the results of the RPAs. As shown in Table 9, of the five permits with monitoring only, two were determined to have reasonable potential (to exceed water quality standards); There is no reason that a higher cadmium standard would result in a more stringent WQBEL, so we do not attribute the results of the RPA to the proposed standard change. One of the five permits was determined to have no reasonable potential but would continue to require monitoring. Finally, two of the five permits were determined to have no reasonable potential. For purposes of this analysis, we assume conservatively that the change to the cadmium standard will allow one of

[22] DENR/DWR "2014 Fiscal and Economic Analysis for the Proposed Amendments to 15A NCAC 02B .0200 – The Triennial Review of Surface Water Quality Standards and Classifications.

every five permits (20%) to be relieved of the monitoring requirement for cadmium.

Table 11 summarizes estimated potential benefits to NPDES wastewater permittees with cadmium monitoring-only requirements that discharge to non-trout freshwater. Only privately-owned and local government-owned facilities are potentially affected. The estimates project benefits over two five-year permit cycles, although it is possible facilities will continue to realize benefits beyond ten years. The savings are likely to be in the form of avoided costs associated with reduced monitoring. Cost savings estimates are derived from the fiscal analysis for the 2014 Triennial Review (Section VIII, pp. 58, 68; Appendix III.9; *Ibid*) which made the conservative assumption that the removal of a metals limit from a permit would result in no savings to the discharger other than reduced monitoring costs. This is because for most dischargers, metals removal is a coincidental benefit of the treatment process which would continue to operate regardless of the metals limits. Sampling would be reduced from quarterly monitoring to no monitoring at an estimated savings of $15 per sample (2014 dollars).

Table 11: Estimated Benefits (Avoided Costs) to NPDES Wastewater Dischargers from Changes to Cadmium Standard over 10 Years
Impact: Relief from Monitoring

	Privately-owned	Local Government-owned
Cost per year	$60	$60
# Years	10	10
Total cost per Facility	$600	$600
# Facilities Impacted	3 *(20% of 16)*	2 *(20% of 11)*
Total Avoided Costs NPV[1], 10 Yrs	**$1,401**	**$934**

[1] Net Present Value (NPV) computed at 7% discount rate, adjusted from 2014 to 2021 dollars.

- **Freshwater Trout**
  We had assumed that dischargers to freshwater trout waters would not see meaningful changes to their permits since the proposed change to the standard is so small; however, this assumption was not borne out by the RPA. The RPA for the one permit that has cadmium limits and discharges to trout waters shows a larger estimated change to their WQBEL than we anticipated. In addition, it appeared to result in a less stringent limit. Based on this cursory review, we were unable to determine the reason for the large change to their WQBEL, but we do not expect that it is a direct result of the change to the limit. It is more likely that factors such as measured flow rates and reported data had much larger effects.

- **Saltwater**
  Dischargers to saltwater are unlikely to see meaningful changes to their WQBELs. Based on the RPA, the one permit that has cadmium limits and discharges to saltwater would not see any change to their cadmium limits. We reason that incremental differences in the cadmium standard result in smaller changes to limits in saltwater as compared to freshwater due to the weight given to hardness in the freshwater calculations. Remember that the saltwater standards calculations do not take into account water hardness. In freshwater, water hardness is an important factor in determining WQBELs because of the relationship between water hardness and toxicity: the lower the hardness, the more toxic cadmium is to aquatic organisms. The relationship between the proposed freshwater standards and water hardness is illustrated in Table 8.

8.4.2 NPDES Industrial Stormwater Dischargers

Stormwater staff with the NC Division of Energy, Mineral and Land Resources confirmed that there is one NPDES stormwater general permit with cadmium monitoring requirements. There are currently 24 Certificates of Coverage issued under the NCG09 permit. The NCG09 permit covers activities associated with manufacturing paints, varnishes, lacquers, enamels and allied products.

Staff estimated that there are 30-40 NPDES stormwater individual permits that require monitoring for cadmium. These facilities are most often associated with power plants, chemical manufacturing, and metals manufacturing.

The stormwater benchmarks for these permittees is 0.002 mg/L (total) for trout waters and 0.003 mg/L (total) for all other waters. The cadmium benchmarks are based on EPA's NRWQC (acute) for dissolved cadmium, calculated with assumed 25 mg/L hardness, then converted to total cadmium using EPA's partition translator. Stormwater staff stated that they do not expect the revised cadmium standards will have a significant effect on the stormwater benchmarks. As such, there should be no impact to stormwater permittees.

8.4.3 DWR Groundwater Protection Program

Of the approximately 30 groundwater protection permits administered by DWR, we were unable to determine which, if any, of these sites require monitoring for cadmium. DWR Groundwater Protection staff report, however, that the impact of the proposed change to the cadmium standard on parties regulated under DWR's Groundwater Protection Program is expected to be negligible. Monitoring of intercepted surface waters at these sites for contaminants of concern will continue to be required regardless of the proposed change, and these sites will continue to be managed so as to prevent violations of the surface water standards.

Similarly, staff with DWR's Non-Discharge and Animal Feeding Operations programs confirmed that they do not anticipate any economic impact to their permittees from the proposed changes to any of the surface water standards, including cadmium.

8.4.4 NC Division of Waste Management

The Division of Waste Management (DWM) was contacted for information about the sites they monitor and regulate under multiple programs. Staff reported that they do not anticipate that any of their sites will be impacted by the proposed change to the cadmium standard.

- Solid Waste program -- Although cadmium is sampled for routinely in surface waters at solid waste sites, it is not the "driver" for cleanup of either groundwater or, indirectly, surface waters.
- Inactive Hazardous Waste program – Cadmium is monitored in surface water at these sites if 1) it is a known contaminant in the groundwater discharge and it is possible that the discharge could intercept surface waters; or 2) if there is evidence of spillage such that a broader range of testing is warranted. Staff state that it is rare to have metals in groundwater at concentrations that could impact surface water. They do not know of any sites where cadmium is an issue.
- Underground Storage Tank program -- Although not a driver for cleanup at waste oil sites (lead and chromium are the main concern), cadmium may be tested for at these sites. Staff report that cadmium is not usually detected above regulatory limits, and it is not a driver for cleanup.
- Hazardous Waste – Hazardous Waste staff report that they have few sites with exceedances of any 02B surface water quality standards. They do not expect an impact from the proposed revisions.

8.4.5 303(d) Impairment and TMDLs

There are currently no waterbodies listed as impaired for cadmium. In the future, waterbodies will continue to be assessed for cadmium impairment, but those assessments will be based on the revised cadmium water quality standards. Assessment for cadmium impairment is already accounted for in DWR's 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. Assessment takes place every two years and includes the toxic substances for which there are water quality standards. The inclusion of the revised cadmium standards will not require additional expenditure, distribution or reallocation of State funds.

Because the proposed cadmium standard is less stringent for freshwaters (except Trout), it is theoretically possible that freshwater waterbodies would be less likely to be listed as impaired for cadmium. This scenario is unlikely, however, since waterbodies are not currently listed as impaired when assessed using the existing more stringent freshwater cadmium standard. It is also theoretically possible that saltwater waterbodies would be

more likely to be listed as impaired for cadmium under the more stringent saltwater standards. We do not expect this to be the case, however, because NPDES effluent limits were shown to be unimpacted by the change to the saltwater standard; it follows that in-stream concentrations of cadmium would be impacted to an even lesser degree.

8.4.6 DWR Ambient Monitoring Program

Cadmium is an existing standard for which a DEQ ambient monitoring program is already established; as such, there should be no budgetary impact to DEQ as a result of adopting the revised standard. Cadmium will continue to be monitored in surface waters by both DWR and monitoring coalitions as part of the Ambient Monitoring System. For consideration in this analysis, DWR Water Sciences Section staff compiled cadmium ambient monitoring data from 2015-2018. Out of 1414 samples, only one sample returned an in-stream concentration that is higher than either the existing chronic standard or the proposed chronic standard. The proposed changes to the cadmium standard will not place any additional requirements on these programs or require shifting of resources.

9. CYANIDE

9.1 Rule Citations

15A NCAC 02B .0211(5) – Fresh Surface Water Quality Standards for Class C Waters

9.2 Proposed Change

North Carolina has an existing surface water quality standard of 5 ug/L for total cyanide in Class C (fresh) waters and an existing water quality standard of 1 ug/L for total cyanide in Class SC (salt) waters. These standards are based on EPA's 1984 *Ambient Water Quality Criteria for Cyanide* (EPA 440/5-84-028; January 1985)[23]. DEQ is proposing to modify the existing Class C standard to include options for analysis of both total cyanide and free cyanide. We are not proposing a modification for saltwater at this time because, unlike the Class C rule, the Class SC rule does not specify that cyanide must be reported as total cyanide.

The current Class C freshwater standard appears in 15A NCAC 02B .0211(5) as:

- *Cyanide, total = 5 ug/L*

The modified Class C freshwater standard will appear in 15A NCAC 02B .0211(5) as:

- *Cyanide, free or total = 5 ug/L*

[23] https://www.epa.gov/sites/production/files/2019-03/documents/ambient-wqc-cyanide-1984.pdf

9.3 Rationale

DEQ is proposing to modify the existing Class C cyanide standard to allow for the analysis of free cyanide as an alternative to total cyanide. This modification is based on the recommendations made in EPA's 1984 *Ambient Water Quality Criteria for Cyanide* (EPA 440/5-84-028; January 1985).

Cyanide is associated with a variety of industrial sources such as steel, petroleum, plastics, synthetic fibers, metal plating, mining, and chemical industries and occurs in water in various forms including: hydrogen cyanide (HCN), the cyanide ion (CN^-), metallocyanide complexes, and organic forms of cyanide. The evaluation of total cyanide encompasses the measure of all forms of cyanide in water while the evaluation of free cyanide encompasses only the measure of HCN and CN^-.

EPA's 1984 *Ambient Water Quality Criteria for Cyanide* established that it is the free cyanides (HCN and CN^-) that best represent the potential for toxic effects to aquatic life. Per the document, acute and chronic exposure to free cyanide in freshwater and saltwater fish and invertebrates has been shown to result in various degrees of toxicity including short-term mortality, reduced growth, and reduced long-term survival. Based on this information, EPA recommended that the cyanide criteria be measured as free cyanide.

However, the EMC adopted the existing cyanide water quality standards as a measure of total cyanide. This was done because, at the time, while EPA recommended cyanide criteria as free cyanide, EPA had not published an approved analytical method for free cyanide. This is significant because EPA approved analytical methods, per 40 CFR part 136, are required to analyze water samples associated with Clean Water Act implementation programs. The existing cyanide water quality standards were adopted as a measure of total cyanide because there was an existing EPA approved analytical method for total cyanide at the time and the measure of total cyanide would provide protection that was equal to, or greater than, the criteria recommend by EPA. EPA eventually approved an analytical method for free cyanide in September of 2019, and it is the approval of this method that provides the basis for the modifications to the existing standards.

The modification of the existing water quality standards will incorporate the option for analyzing cyanide as either free or total cyanide. The modified cyanide standards, whether analyzed as free or total cyanide, will continue to protect aquatic life from exposures to cyanide in the water column for fresh water aquatic life. The modification to include free cyanide brings the existing standards closer to the EPA recommended criteria, does not require a change to the numeric values (magnitudes) already in rule, and provides permittees a degree of flexibility in determining which form of cyanide to analyze.

9.4 Anticipated Impacts (Cyanide)

Upon completion of the triennial review process, the revised cyanide standard will apply to all fresh waters of the state. Anticipated impacts to affected parties as well as to the environment are discussed in the following sub-sections.

9.4.1 NPDES Wastewater Dischargers

The proposed standard for cyanide will be implemented through a subset of individual National Pollutant Elimination System (NPDES) wastewater permits as water-quality based effluent limits (WQBELs). The proposed change to the cyanide standard will not alter the approach to setting permit limits for this compound: water quality-based limits will continue to be based on Reasonable Potential Analyses. Nor will it result in any additional costs associated with monitoring since facilities with individual permits are already conducting effluent monitoring for cyanide as required in their permits.

NPDES wastewater staff reported that there are no general permits that require monitoring or have limits for cyanide. They reported that of the approximate total **1,094** active individual NPDES wastewater permits (includes pre-treatment permits), there are **40** active individual permits which have either limits or monitoring requirements for cyanide. Of those 40 permits, 26 have limits and 14 have monitoring only. Note that for purposes of this analysis, we make the conservative assumption that all limits are water quality based (WQBELs) and not technology based (TBELs). A list of facilities with cyanide requirements is included in Appendix V.

Of the 26 permits that have cyanide limits:

- 13 are publicly-owned treatment works (POTWs);
- 1 is a publicly-owned water treatment plant;
- 4 are metals manufacturers;
- 1 is a chemical manufacturer;
- 1 is an automotive parts manufacturer;
- 1 is a synthetic fiber and materials manufacturer;
- 1 is a nuclear fuel manufacturer;
- 1 is an electronics manufacturer;
- 1 is a biomanufacturer; and
- 2 are industrial and commercial WWTPs with multiple types of waste streams.

Of the 14 permits that require monitoring of cyanide but do not have limits:

- 10 are publicly-owned treatment works (POTWs);
- 1 is a publicly-owned water treatment plant;
- 1 is a privately-owned water treatment plant (reverse osmosis);
- 1 is a chemical manufacturer; and
- 1 is a groundwater remediation site.

It is reasonable to assume that in any given water sample, the concentration of free cyanide will be lower (and not equal) to the concentration of total cyanide. This could make it easier for permittees to meet WQBELs for cyanide. For this reason, the change to the cyanide standard should provide some regulatory relief to permittees that choose to report data as free cyanide. We do not have information to suggest whether or not a significant number of existing or future permittees will choose the free cyanide alternative. However, we were provided information by one existing permittee who has expressed interest in incorporating free cyanide into their individual NPDES permit. They estimated that they could realize annual cost savings of at least $100,000 from switching analytical methods to free cyanide for their permit. This presumes, of course, that they would be able to meet a free cyanide WQBEL. A small portion of the savings would come from avoided costs associated with collecting, processing, and analyzing samples. The bulk of the savings would come from avoided costs associated with professional services used to address exceedances of the total cyanide limit such as attorneys, engineers, construction services and other consultants. The permittee estimated that in some years, depending on the complexity of services required, their costs to address exceedances of their permit limit has been in the hundreds of thousands of dollars. For purposes of this analysis, however, we have chosen a conservative benefit of $100,000 per year (Table 12).

Because of the considerable variability between permits and the lack of information about whether other permittees will take advantage of the revised standard, we did not attempt to generalize this single permittee's estimate to the regulated community as a whole. It is reasonable to expect that permittees that are experiencing problems with cyanide would request to use the revised standard. They would only realize cost savings, however, if the treatment of cyanide is a driving treatment cost factor. Based on NPDES staff experience, cyanide is not a common driving cost factor; as such, we do not expect a significant proportion of permittees to realize cost savings, even if they do use the free cyanide alternative. For purposes of this analysis, we are including this single estimate as a minimum potential benefit of the revised cyanide standard. Because we do not know if other permittees will choose to switch to free cyanide, we did not attempt further analysis.

Table 12: Potential Cost Savings for NPDES Wastewater Permittees from Cyanide Standard Change over 10 Years

# Facilities Impacted	1
Cost savings per year	$100,000
# Years	10
Total Cost Savings	$1,000,000
Total Cost Savings, NPV[1]	**$702,358**

[1] Net Present Value (NPV) computed at 7% discount rate.

9.4.2 NPDES Industrial Stormwater Dischargers

Stormwater staff with the NC Division of Energy, Mineral and Land Resources (DEMLR) confirmed that there no NPDES stormwater general permits with a cyanide monitoring requirement.

Staff conducted a preliminary search of their database to identify NPDES stormwater individual permits that require monitoring for cyanide. They did not identify any permits with cyanide requirements. Due to time and staff resource constraints, a more thorough search was unable to be conducted. It is possible that there are a small number of individual permits with cyanide requirements that weren't identified by their preliminary search. In any case, Stormwater staff do not expect that these permits would be impacted by the proposed change to the cyanide standard because their stormwater benchmark is already expressed as free cyanide (converted to Total for purposes of NPDES reporting requirements).

9.4.3 DWR Groundwater Protection Program

Of the approximately 30 groundwater protection permits administered by DWR, we were unable to determine which, if any, of these sites require monitoring for cyanide. DWR Groundwater Protection staff report, however, that the impact of the proposed change to the cyanide standard on parties regulated under DWR's Groundwater Protection Program is expected to be negligible. Monitoring of intercepted surface waters at these sites for contaminants of concern will continue to be required regardless of the proposed change, and these sites will continue to be managed so as to prevent violations of the surface water standards.

Similarly, staff with DWR's Non-Discharge and Animal Feeding Operations programs confirmed that they do not anticipate any economic impact to their permittees from the proposed changes to any of the surface water standards, including cyanide.

9.4.4 NC Division of Waste Management

The Division of Waste Management (DWM) was contacted for information about the sites they monitor and regulate under multiple programs. Staff reported that they do not anticipate that any of their sites will be impacted by the proposed change to the cyanide standard.

- Solid Waste program -- Although cyanide is sampled for routinely in surface waters at solid waste sites, it is not the "driver" for cleanup of either groundwater or, indirectly, surface waters.
- Inactive Hazardous Waste program – Staff report that it is rare to have cyanide in groundwater at concentrations that could affect surface water. It is monitored in surface water at these sites if 1) it is a known contaminant in the groundwater discharge and it is possible that the discharge could intercept surface waters; or 2) if there is evidence of

spillage such that a broader range of testing is warranted. They do not know of any sites where cyanide is an issue.

- Underground Storage Tank program -- The UST Section reports that they do not test for cyanide as it is not expected to be contained in petroleum.
- Hazardous Waste – Hazardous Waste staff report that they have few sites with exceedances of any 02B surface water quality standards. They do not expect an impact from the proposed revisions.

9.4.5 Impairment 303(d) and TMDLs

There are currently no waterbodies listed as impaired for cyanide. In the future, waterbodies will continue to be assessed for cyanide impairment, but those assessments will be based on the revised cyanide water quality standard. Assessment for cyanide impairment is already accounted for in DWR's 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. Assessment takes place every two years and includes the toxic substances for which there are water quality standards. The inclusion of the revised cyanide standard will not require additional expenditure, distribution or reallocation of State funds.

Because the proposed cyanide standard is less stringent, it is theoretically possible that waterbodies would be less likely to be listed as impaired for cyanide. This scenario is unlikely, however, since waterbodies are not currently listed as impaired when assessed using the existing more stringent total cyanide standard.

9.4.6 DWR Ambient Monitoring Program

Cyanide is an existing standard for which a DWR ambient monitoring program is already established; as such, there should be no budgetary impact to this program as a result of adopting a revised standard. Cyanide will continue to be monitored in surface waters by both DWR and monitoring coalitions as part of the Ambient Monitoring System. For consideration in this analysis, DWR Water Sciences Section staff compiled cyanide ambient monitoring data from 2012-2018. Out of 63 samples, none returned an in-stream concentration that is higher than the cyanide standard. The addition of the free cyanide measure as an option will not place additional requirements on these programs or require shifting of resources.

10. Site-Specific Recreational Bacteria (E. Coli) for the Asheville Region

10.1 Rule Citation

15A NCAC 02B .0219 (3)(c)-- Fresh Surface Water Quality Standards for Class B Waters

10.2 Proposed Change

North Carolina has existing surface water quality recreational bacteria standards for primary recreation (Class B) in fresh waters. These standards apply to all Class B waters in the state and are based on EPA's 1976 *Quality Criteria for Water* (EPA 440-9-76-02)[24]. The current Class B bacterial recreation standard appears in 15A NCAC 02B .0219(3)(b) as:

> *(3)(b) Fecal coliforms shall not exceed a geometric mean of 200/100 ml (MF count) based on at least five samples taken over a 30-day period, nor exceed 400/100 ml in more than 20 percent of the samples examined during such period.*

DEQ is proposing to incorporate site-specific bacterial recreation criteria to apply to the Class B waters within the 19 counties that comprise the Asheville Region. This site-specific criteria will replace the fecal coliform pathogen indicator in these Ashville Region waters with the *Escherichia coli* (*E. coli*) pathogen indicator as recommended in EPA's 2012 *Recreational Water Quality Criteria* (EPA 820-F-12-058)[25].

The site-specific Class B bacterial recreation standard for the Asheville Region will be added as 15A NCAC 02B .0219(3)(c) and will read:

> *(3)(c) For the counties listed in this Sub-Item, Escherichia coli (E. coli) shall be used as the bacterial indicator in lieu of Sub-Item (b) of this Item. E. coli shall not exceed a geometric mean of 100 colony forming units (cfu) per 100 ml (MF count) or a most probable number value (MPN) of 100 per 100 ml based upon a minimum of five samples taken over a 30-day period, and E. coli shall not exceed 320 cfu/100 ml or 320 MPN/100 ml in more than 20 percent of the samples examined during the same 30-day period. The counties subject to this site-specific standard are:*
> *(i) Avery;*
> *(ii) Buncombe;*
> *(iii) Burke;*
> *(iv) Caldwell;*
> *(v) Cherokee;*
> *(vi) Clay;*
> *(vii) Graham;*
> *(viii) Haywood;*
> *(ix) Henderson;*
> *(x) Jackson;*
> *(xi) Macon;*
> *(xii) Madison;*
> *(xiii) McDowell;*
> *(xiv) Mitchell;*

[24] https://www.epa.gov/sites/production/files/2018-10/documents/quality-criteria-water-1976.pdf
[25] https://www.epa.gov/sites/production/files/2015-10/documents/rwqc2012.pdf

(xv) Polk;
(xvi) Rutherford;
(xvii) Swain;
(xviii) Transylvania; and
(xix) Yancey.

10.3 Rationale

Rule 15A NCAC 02B .0219 establishes the water quality standards for primary contact recreation (Class B) waters. Primary recreation is defined in 15A NCAC 02B .0202(43) to mean "*...swimming, diving, skiing, and similar uses involving human body contact with water where such activities take place in an organized or on a frequent basis.*" The focus of these standards is to protect recreators from gastrointestinal illnesses associated with exposure to pathogenic organisms in contaminated surface waters. These pathogenic organisms include bacteria and viruses that are associated with human and other mammalian waste. To accomplish this, pathogenic indicators are used to evaluate surface waters for the presence of these pathogenic organisms.

A pathogenic indicator is defined by EPA in §502(23) of the Clean Water Act (CWA), as "*a substance that indicates the potential for human infectious disease.*" Pathogenic indicator organisms do not necessarily cause illness themselves; however, they are associated with fecal contamination of surface waters and are employed as a means for estimating the concentration of pathogenic bacterial and viral organisms associated with such contamination that may not be measurable using standard laboratory methods.

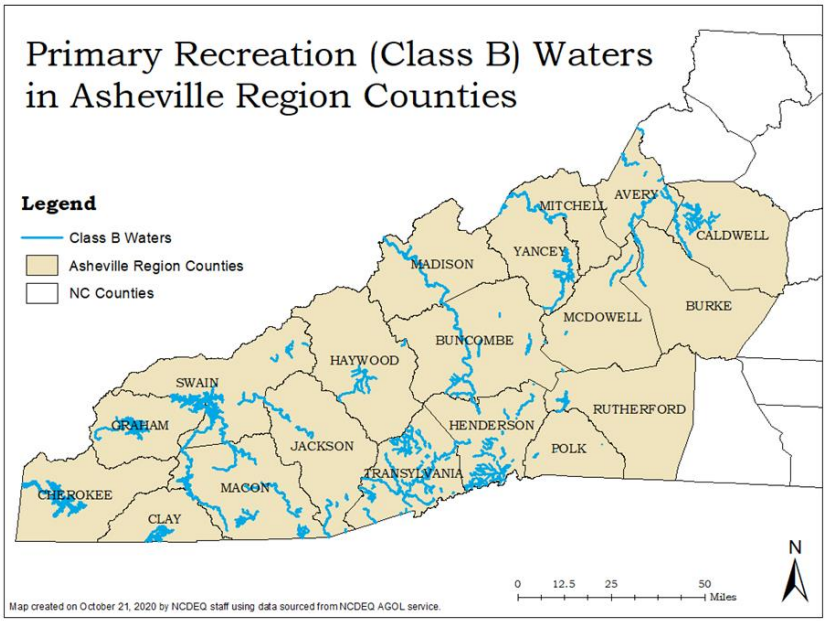
The use of the fecal coliform bacteria group as a pathogenic indicator dates back to the 1960's. EPA began recommending the use of *E. coli* as a pathogenic indicator in surface waters in the 1986 *Ambient Water Quality Criteria for Bacteria*. EPA has since released updated recreational criteria with the publishing of the 2012 *Recreational Water Quality Criteria* and public interest in the use of *E. coli* as a pathogenic indicator has grown with recent EPA approval of an *E. coli* analytical method (Colilert®) that provides a quicker turn-around time as compared to traditional methods and is easier to perform. In terms of environmental protection, neither indicator is considered more stringent or more protective than the other.

DEQ is proposing to adopt the site-specific bacterial recreation standard for *E. coli* to apply to the Class B waters within the 19 counties that comprise the Asheville Region. The updating of the fecal coliform standard indicator to an *E. coli* standard indicator was requested by non-governmental organizations and the DWR Asheville Regional Office staff. Non-governmental organizations in the region have devoted time and resources to monitoring these waters based on the updated recreational criteria for *E. coli* as recommended by EPA in the 2012 *Recreational Water Quality Criteria* and have also been working closely with DWR Asheville Region staff who have established the use of *E. coli* testing methods in the DWR Asheville Region Laboratory. This proposed site-specific standard seeks to update the Class B protections for the recreational waters in the Asheville Region by updating the existing Class B pathogenic indicator to match the current state of the science which supports the transition to the *E. coli* pathogenic indicator.

It is important to note that while the EPA 2012 *Recreational Water Quality Criteria* recommends that the pathogenic indicator standards for primary recreation waters be updated from fecal coliform to *E. coli*, it is not feasible at this time for North Carolina to switch to the *E. coli* pathogenic indicator for Class B waters statewide. This is because: (1) The DWR central laboratory in Raleigh does not currently have the resources to incorporate the new analytical methods required for analysis of *E. coli* in surface water. It will take time and money to procure the necessary resources which include equipment, materials, staffing, and laboratory space; (2) The adoption of the *E. coli* pathogenic indicator as a statewide standard would require re-evaluation of water quality protection programs to evaluate whether those program would be required to adjust their regulatory operations and switch from the fecal coliform pathogenic indicator to the *E. coli* pathogenic indicator; and (3) Certified laboratories would likely require time to adjust their operations to incorporate new methods for *E. coli* analysis. For these reasons, DEQ is proposing to limit the application of the new *E. coli* standard to the Asheville region which is already capable of absorbing the testing requirements into its existing operations.

10.4 Anticipated Impacts (*E. Coli*)

Upon completion of the triennial review process, the revised *E. coli* standard will apply to Class B waters in the 19 counties of the Asheville Regional Office area. Within this region, there are about 240 named streams that have some portion classified for primary recreation (Class B).



Anticipated impacts to affected parties as well as to the environment are discussed in the following sub-sections.

10.4.1 NPDES Wastewater Dischargers

The proposed standard for *E. coli* will be implemented through a subset of individual and general National Pollutant Elimination System (NPDES) wastewater permits as water-quality based effluent limits (WQBELs). The proposed change to the recreational water quality standard will not alter the approach to setting permit limits for this compound: water quality-based limits will continue to be based on Reasonable Potential Analyses (RPAs). Because pathogens are present at significant levels in all untreated municipal wastewater, it is presumed that all municipal wastewater treatment plants that discharge to recreational waters have a reasonable potential to cause or contribute to an excursion above the applicable recreational water quality standard. These excursions are expected regardless of the pathogenic indicator used. The fecal coliform and *E. coli* standards are considered equally protective; as such, we do not expect that the change to *E. coli* will result in a significant change to the number of excursions above the standard or exceedances of permit limits. Facilities are already conducting effluent monitoring for one pathogenic indicator (fecal coliform), so the change to *E. coli* will not result in additional costs associated with monitoring.

10.4.2 NPDES Industrial Stormwater Dischargers

There are four NPDES stormwater general permits with fecal coliform monitoring requirements:

- NCG02 Mining
- NCG06 Food and Kindred;
- NCG12 Landfills; and
- NCG24 Compost facilities.

The NCG02 Mining general permit requires fecal coliform monitoring only for facilities with stormwater outfalls discharging to Class SA waters; as such, none of the NCG02 permittees will be impacted by the proposed rule change. There are currently a total of 19 Certificates of Coverage issued under the other 3 general permits to facilities located in one of the 19 counties within the Asheville regional office. Of these 19 COC's, only 5 have stormwater outfalls that discharge to Class B waters:

- NCG06 – 2 COC's to Class B waters;
- NCG12 – 3 COC's to Class B waters;
- NCG24 – 0 COC's to Class B waters;

Due to time and staff constraints, we were unable to determine how many NPDES stormwater individual permits have requirements for fecal coliform monitoring. Staff reported it is relatively uncommon for individual permittees to have fecal coliform monitoring requirements, so there are likely very few, if any, individual permits located in the Asheville RO area that discharge to Class B waters. Fecal coliform is not used often in stormwater permits because of challenges associated with interpreting the data.

Stormwater runoff tends to cause dramatic spikes in fecal coliform levels and attributing the cause of a spike to activities associated with the permitted industry can be challenging.

Permittees are not expected to incur additional costs as the switch to *E. coli* would be incorporated into the regular permit renewal process. Fees paid to laboratories for testing should be comparable when considering that testing materials for *E. coli* are higher than fecal coliform, but staff resources (time) required for *E. coli* testing are expected to be less than for fecal coliform testing.

10.4.3 DWR Groundwater Protection Program

Of the approximately 30 groundwater protection permits administered by DWR, 5 are located in the Asheville Regional Office area. We were unable to determine which, if any, of these sites require monitoring for fecal coliform. DWR Groundwater Protection Program staff report that the most common parameters monitored are nitrates, dissolved solids, chloride, pH, metals and occasionally volatile organics, pesticides, and semi-volatiles. Similar to the other parameters, we do not expect a significant impact from a change to this water quality standard. Monitoring of intercepted surface waters at these sites for contaminants of concern will continue to be required regardless of the proposed change, and these sites will continue to be managed so as to prevent violations of the surface water standards.

Under the Animal Feeding Operations Program, fecal coliform is used as a measure of pathogen reduction for performance standards for new or expanding swine operations and for sampling of sources of discharge in the event of an unpermitted discharge. Under the Non-discharge Program, fecal coliform monitoring is used as a measure of pathogen reduction for residuals application. Under both these programs, affected permits in the Asheville area will need to be revised to reflect the new *E. coli* standard. This would take place during the renewal process for general or individual permits, and is therefore unlikely to place additional burdens on these programs or require shifting of resources.

When asked about the impacts of switching from fecal coliform to *E. coli*, DWR Animal Feeding Operations programs staff expressed concern about the availability of commercial laboratories certified to analyze for *E. coli* that are located within required sample hold times. We have confirmed that there are currently five commercial laboratories certified for *E. coli* within hold time requirements of the Asheville area (3 in Charlotte, 1 in Cherokee, 1 in Greenville, SC). The switch from fecal coliform to *E. coli* should not result in logistical issues for permittees or DWR inspectors that use commercial laboratories.

10.4.4 NC Division of Waste Management

As with other parameters in this rulemaking, we do not anticipate impacts to sites regulated under the Division of Waste Management (DWM).

10.4.5 Impairment 303(d) and TMDLs

There are currently about 20 waterbodies located in the Asheville Regional Office area that are listed as impaired for fecal coliform. After adoption of the *E. coli* standard, these waterbodies will be assessed for *E. coli* impairment. DWR staff do not expect that the shift to a different pathogen indicator will result in changes to waterbody impairments. Assessment for fecal coliform impairment is already accounted for in DWR's 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. The inclusion of the *E. coli* standard will not require additional expenditure, distribution or reallocation of State funds.

10.4.6 DWR Ambient Monitoring Program

Upon adoption as a standard, *E. coli* will be added to the basic core suite of indicators that are routinely measured at the 12 ambient monitoring stations in Class B waters of the Asheville region. The impact of this change will be on the State water quality laboratory at the Asheville Regional Office where staff process the samples. There would be additional costs due to the high cost of the test kits for *E. coli* relative to the testing materials fecal coliform. The State lab could realize equivalent avoided costs in the form of time savings, however, associated with the less time- and labor-intensive Colilert® test method. The labs would incur higher net costs, however, if samples must be analyzed for both fecal coliform and *E. coli* to satisfy different permitting program requirements. We are still determining whether that is likely to occur. For purposes of this analysis, we will assume that only one pathogen indicator parameter will be required for a given sample.

An additional complicating factor will be that the *E. coli* standard will only apply to a subset of waters in the Asheville Regional Office area; the majority of ambient monitoring samples processed by the State lab will continue to be fecal coliform. This means that the State lab will need to be equipped and staffed to run tests for both. This poses a logistical challenge in terms of incubator space, laboratory space, and staff scheduling. Staff in the Asheville Regional Office have confirmed their support for this change despite these challenges due to the potential for significant staff time savings. The costs and benefits associated with the current fecal coliform test method and the two possible *E. coli* test methods are summarized in Table 13.

Table 13: Cost comparison of Fecal Coliform versus E. coli Test Methods State DWR Laboratory – Asheville

	Test Method		
	Fecal coliform by MF *(current method)*	*E. coli* by MF	*E. coli* by Colilert-18® *(preferred method)*
Cost per sample *(testing materials)*	$3.05	$5.50	$12.00 (State contract)
Average # samples/yr	1,500	1,500	1,500
Total cost/yr *(testing materials)*	**$4,575**	**$8,250**	**$18,000**
Staff time per sample	0.5 hrs	0.75 hrs	0.25 hrs
Avg lab staff salary*	$35.88/hr	$35.88/hr	$35.88/hr
Staff cost/sample *(opportunity cost)*	$17.94	$26.91	$8.97
Total staff cost/yr *(opportunity cost)*	**$26,910**	**$40,365**	**$13,455**
Total cost of method/yr *(materials + opportunity cost)*	$31,485	$48,615	$31,455
Total cost 10 yrs	$314,850	$486,150	$314,550
Total cost (staff + testing materials), NPV[1], 10 yrs	**$221,137**	**$341,451**	**$220,927**
Notes	Two-step verification process using two different medias. Incubates at 44.5 degrees for 24 hours	Multistep verification procedure using four different medias. More time consuming than Fecal by MF due to extra QC, spiking and more complex verifications. Incubates for 2 hours at 35 degrees and then 44.5 degrees for 22 hours. This extra step limits how late in the day samples can be set.	No verification required. Incubates @ 35 degrees for 18 hours.

[1] Net Present Value (NPV) computed at 7% discount rate.

*Staff salary derived from the average annual salary range of Water Sciences Section staff and includes the fringe benefits for insurance, social security, etc. as stipulated in the NC Office of State Personnel Compensation Calculator http://www.osp.state.nc.us/Reward/benefits/Compensation%20Calculator.htm

The Asheville lab will be able to handle the workload associated with the *E. coli* testing without additional personnel or equipment. There is a sizeable difference in opportunity cost savings (staff time) associated with the different methods, with *E. coli* by membrane filtration requiring the most staff time and *E. coli* by Colilert® requiring the least staff time (Table 13). In total, the adoption of the *E. coli* standard as proposed and use of the Colilert® method could result in a modest net savings in the form of opportunity cost savings to the State of approximately $210 NPV over a 10-year period as compared to the status quo (fecal coliform by MF). If the State is able to procure the Colilert® test kits at a lower price (< $12/unit), it would result in a significantly larger net savings to the State over the status quo.

10.4.7 Commercial laboratories

Commercial laboratories that are certified for *E. coli* should expect the same categories of costs and benefits as the State lab; however, the costs for the Colilert® test kits are likely to be lower for private labs as compared to the State government contract prices. We were unable to estimate potential costs or benefits to commercial labs due to lack of information. To provide reasonable estimates, we would need to know how many fecal coliform samples various commercial laboratories process from permitted dischargers that discharge to Class-B waters in the Asheville Regional Office area. Time and staffing constraints did not allow us to pursue this type of information. We can assume, however, that net benefits to commercial labs certified for *E. coli* could exceed those to the State due to their lower costs for test kits. To assist with estimating these costs, DEQ solicited input from a regional environmental advocacy group that has already been testing for *E. coli* using the Colilert® method. They estimate their costs to be approximately $7.26 per sample, considerably lower than the State contract price of $12.00 per sample.

Commercial labs would incur additional costs if they seek certification from DEQ to begin testing for *E. coli*. For a certified commercial lab, this would consist of a recurring annual fee of $85. Commercial labs that are not certified by DEQ for any parameters would incur an additional one-time cost of $300 (certification application fee) and a minimum $3,500 parameter fee. Commercial labs that aren't equipped for *E. coli* testing would also incur one-time costs associated with equipment setup. The same regional environmental advocacy group provided DEQ with the following estimated costs associated with initial setup and equipment purchases for *E. coli* using Colilert-18®:

IDEXX® Sealer: $3,750.00
Certified Incubator: $1,895.00
UV Viewing Cabinet and Lamp: $300.00
QA/QC Comparator Tray: $22.00
Refrigerator (if samples will not be processed immediately): Varies

Commercial laboratories will not be required by this rule change to test for *E. coli* or to seek certification. We cannot reasonably predict whether laboratories will choose to

pursue certification; as such, we did not attempt to monetize potential benefits from certification. It may be reasonable to assume, however, that commercial labs that gain certification for *E. coli* would realize long-term net benefits if they acquire new clients as a result of the additional certification.

11. Environmental and Human Health Impacts

Regulations aimed at environmental protection provide a wide range of benefits to the public. Environmental protections can provide both economic benefits and, indirectly, human health benefits. The proposed changes to the water quality standards are expected, at a minimum, to provide mechanisms to:

- prevent increased concentrations of selenium in surface waters;
- allow for a more accurate and scientific assessment of the health of the state's aquatic habitats for selenium, cadmium, cyanide, and pathogenic indicators; and
- increase the potential for the formal assessment of water bodies for 1,4-dioxane impairment, which could lead to the development of TMDLs that compel broader regulatory protections and corrective actions that result in increased human health protections over ongoing regulatory actions.

We expect the largest proportion of benefits from the proposed rule changes will be to aquatic life. Benefits could be in the form of reduced mortality for aquatic organisms, improved reproductive success of aquatic organisms, increased diversity of aquatic organisms; and improved conditions for successful recovery of threatened and endangered species. As a result of the improvement to aquatic life, secondary benefits could be realized in the form of enhanced recreational and commercial activities, including fishing. Other secondary benefits could result in the form of reduced human exposure to pollutants and increased economic development opportunities.

Adopting the updated EPA NRWQC for selenium, cadmium, cyanide, and pathogenic indicators will allow for a more accurate and scientific assessment of the health of the state's aquatic habitats. Accurate determination of attainment of designated uses should allow DEQ and other stakeholders to tailor protections and corrective actions to better address the source of a problem or potential threat to water quality, such as with targeted reductions in metals concentrations from identified anthropogenic sources. We were unable to monetize benefits associated with more accurate attainment determination, but its importance should not be discounted.

Other potential benefits that can be expected as a result of the proposed standards change include nonuse benefits. Nonuse benefits refer to benefits that people receive from the existence of an environmental feature independent of people's current resource use. For example, some people value protection of coastal waters even if they may never visit the beach. Nonuse benefits include bequest, existence, and ecological preservation values.

- Bequest value of a natural resource is the value people place on being able to provide future generations with a pristine natural resources.

- Existence benefits occur when people value a resource or natural feature maintained in its current condition. An example of existence value is the substantial amount of money directed to conservation groups for land preservation.
- Ecological preservation is the protection of an entire ecology or system of plants and animals and their physical habitats. Strong ecosystems preserve biodiversity, making organisms more resistant to environmental stresses.

Nonuse benefits are difficult to value since they lack traditional markets, but these values can be significant. This fiscal analysis does not attempt to monetize nonuse values of cleaner water; however, this benefit does exist and should be taken into account when policy decisions are made.

Additional benefits specific to each parameter are discussed in more detail in the following sub-sections.

11.1 Selenium

Although our Reasonable Potential Analyses for 8 of 35 permits that have limits or monitoring requirements for selenium did not indicate that there would be impacts from the revised standard, we cannot absolutely rule out that there could be impacts to these or the remaining 27 permits from the revised standard. For this reason, there is a possibility that there could be additional water quality improvements not accounted for in this analysis.

It is likely, however, that a majority of permits would at least receive revised water-quality based effluent limits. Although no changes in permit requirements, facility operations, or discharges are expected in the near term as a result of the new limits, the standard upon which they are based is more reflective of the current science on selenium toxicity to aquatic life. In effect, this should better equip DEQ and facilities to protect aquatic life biodiversity by detecting any future problem with selenium in effluent earlier which will, in turn, promote an earlier response from facilities. Earlier intervention by the facility has the potential to prevent water quality degradation and perhaps allow the facility to avoid costly treatment requirements in the future.

Whether implemented as WQBELs or used to perform more accurate waterbody assessments, the proposed changes to the selenium water quality standard could aid efforts to stabilize and/or enhance species biodiversity in state waters. The concept of biodiversity reflects the benefits of maintaining and protecting a wide range of aquatic habitats, a wide range of organisms in those habitats and a large enough population of individual organisms to ensure genetic diversity and allow organism adaptation. Aquatic biodiversity has been shown to provide many valuable goods and services that benefit humans – some of which are considered to be irreplaceable.[26]

[26] Covich, A.P. Ewel, K.C., Hall, R.O., Giller, P.E., Goedkoop, W., and Merritt, D.M. (2004). Ecosystem services provided by freshwater benthos. In *Sustaining Biodiversity and Ecosystem Services in Soil and Sediments* (ed. D.H. Wall), pp.45-72. Island Press, Washington D.C., USA.

Reduced water pollution and healthier aquatic ecosystems may translate to higher catch rates and increased commercial fishing productivity in North Carolina. Metals contamination of soft bottom habitat is an ongoing threat to commercial fisheries. Soft bottom habitat is unconsolidated, unvegetated sediment that occurs in freshwater, estuarine, and marine systems. Soft bottom habitat is a key foraging habitat for juvenile and adult fish and invertebrates and aids in storing and cycling of sediment, nutrients, and toxins between the bottom and water column. Shallow, unvegetated bottom is particularly productive and, by providing refuge from predators, is an important nursery area. A reduction in metals-contaminated soft bottom habitat can result in significant avoided costs to commercial fisheries.

A reduction in the concentration of selenium, as well as the prevention of future increases of selenium concentration, in surface waters would provide a direct ecological benefit to aquatic ecosystems and may indirectly benefit human uses as well (for example, by aiding in the recovery of fishery resources).

11.2 Cadmium

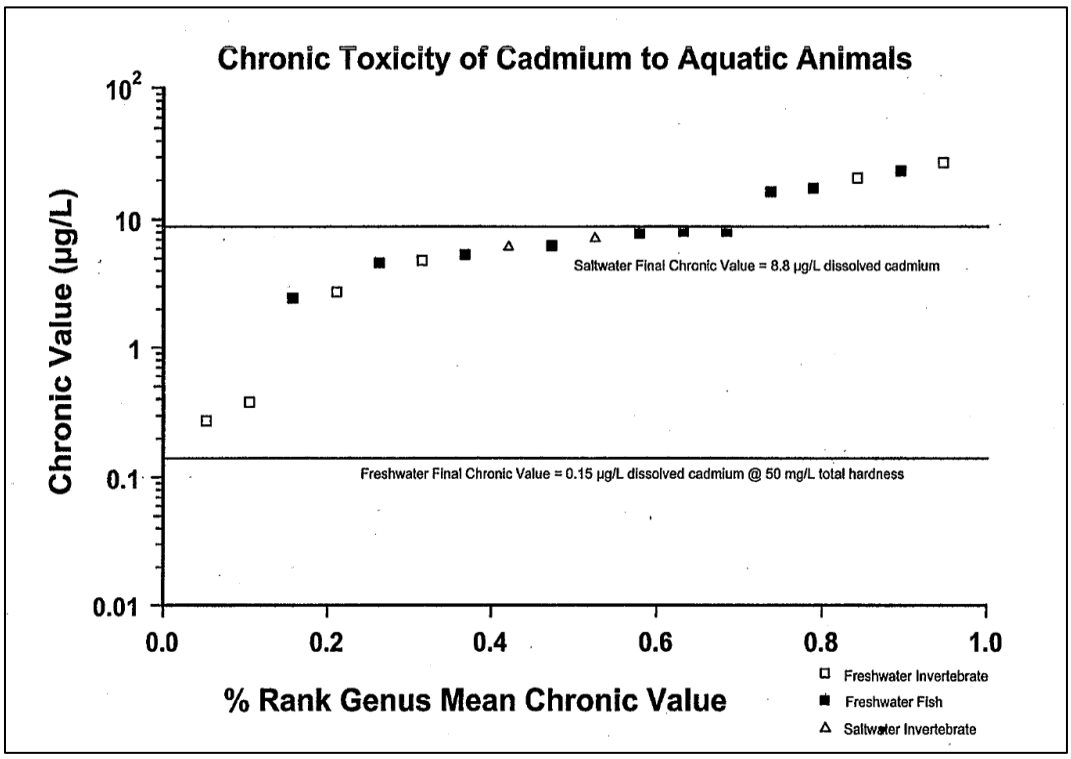
We expect that the changes to the cadmium standard will continue to prevent unacceptable toxicity effects to aquatic organisms, even if the proposed changes reduce regulatory burden. To understand how changes to an existing standard for the protection of aquatic life can provide regulatory relief without resulting in negative impacts to that aquatic life, it is helpful to understand how EPA derives its water quality criteria.

EPA water quality include magnitude, duration, and frequency components. These components estimate the rate (frequency) at which in-stream contaminant concentrations, as averaged over a specified period of time (duration), can be above a numeric threshold (magnitude) in a waterbody without resulting in unacceptable effects to aquatic organisms in a waterbody. It is important to note that the criteria are intended to protect *most*, but not necessarily *all*, aquatic organisms at all times. That is to say, adverse effects may result from temporary excursions above the numeric threshold; however, the degree to which those adverse effects occur should not reach a level that is considered unacceptable, as defined by the criteria.

As the EPA periodically re-evaluates existing National Recommended Water Quality Criteria (NRWQC), new toxicity information may become available that leads to a better understanding of the relationships between aquatic organisms and the toxic effects of a contaminant. This may lead to the publishing of new NRWQC that provide a more appropriate numeric threshold value.

For example, the existing cadmium chronic water quality standard for the protection of freshwater aquatic life is based on the 2001 EPA NRWQC which incorporated toxicity data from 65 species in 55 genera. Figure 1 provides a summary of the toxicity data, ranked by organism sensitivity, used in the 2001 NRWQC chronic cadmium evaluation.

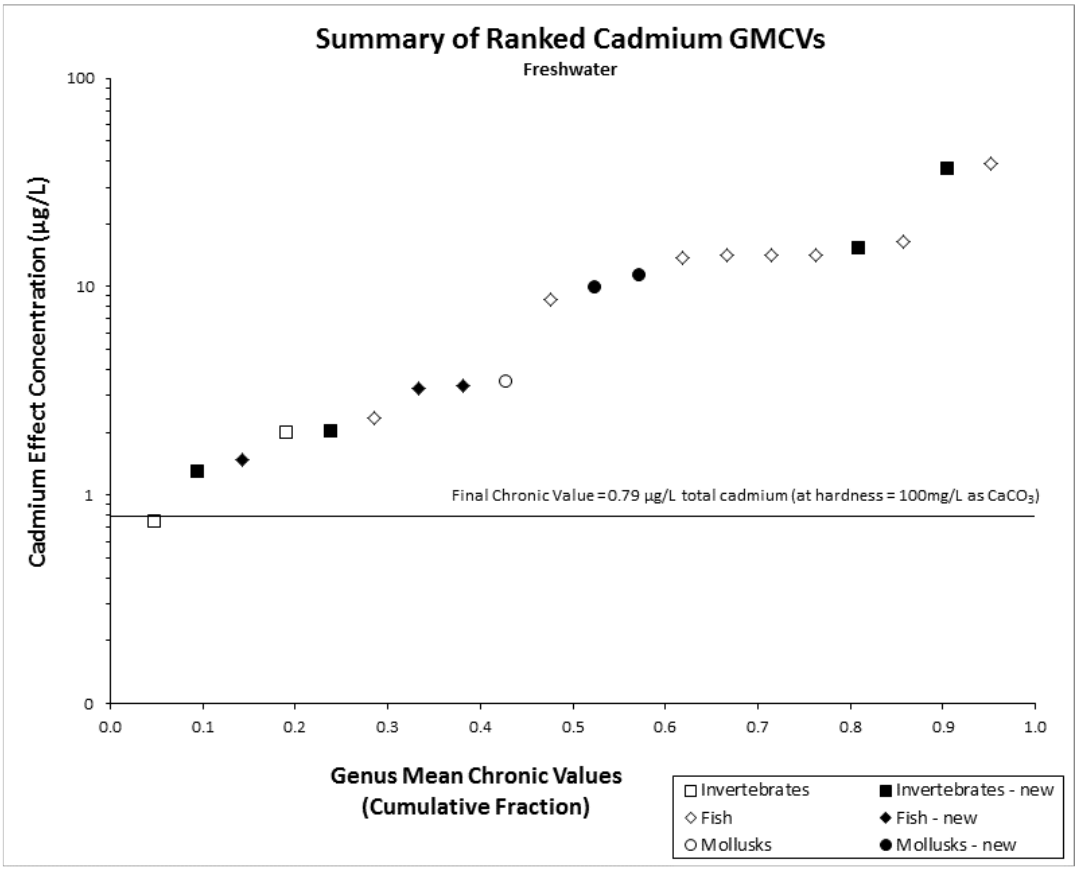
Figure 1: Summary of ranked chronic toxicity response data (Source: EPA, 2001)



Each point in the distribution represents toxicity sensitivity data (chronic value or effect concentration) as a geometric mean from studies of groups of organisms in related genera. The horizontal line titled "Freshwater Final Chronic Value" is the protective threshold for cadmium (0.15 ug/L) as calculated per EPA guidance documents and normalized to 50 mg/L hardness.

In 2016, EPA published an updated evaluation of the cadmium data that incorporated toxicity data for 75 new species and 49 new genera. This updated data allowed for a recalculation of the criterion resulting in a more precise protective threshold value as compared to the 2001 document. Figure 2 provides a summary of the 2016 ranked toxicity data as well as the freshwater "Final Chronic Value" (0.79 ug/L) normalized to 100 mg/L hardness.

Figure 2: Summary of ranked chronic toxicity response data (Source: EPA, 2016)



The additional data in the 2016 evaluation indicates that the most sensitive freshwater species can tolerate higher concentrations of cadmium than previously thought before exhibiting signs of chronic toxicity. Compared to Figure 1, the four most sensitive organism groups in Figure 2 have changed, both in the organism distribution and in the degree of sensitivity. In the 2001 evaluation, two groups of freshwater invertebrates represented the two most sensitive organism groups followed by a large gap in sensitivity before the third most sensitive group of organisms appears (represented by a group of freshwater fish). In the 2016 evaluation, however, while the most sensitive organism group is still represented by a freshwater invertebrate, the second and third most sensitive organism groups are now represented by a freshwater fish and a freshwater mollusk (a new genera), respectively. Also, due to the incorporation of additional toxicology data, the estimated sensitivity of the most sensitive organism group has decreased, resulting in a higher chronic effect concentration than that reported in 2001. This same additional toxicity information also leads to the slightly higher protective threshold value (criterion) provided in the 2016 criteria document.

Even though the 2016 cadmium chronic criterion is greater (less stringent) than the current NC chronic freshwater standard, 0.25 ug/L vs. 0.15 ug/L (calculated at 25 mg/L hardness), respectively, the additional toxicity information used in the derivation of the 2016 criterion has provided a greater degree of confidence that the 2016 criteria better achieves the goal of

preventing unacceptable levels of toxicity in NC waters without creating undue burdens. In other words, the change to the numeric criteria represents a change in the degree of confidence in the derived criteria itself; it will not result in unacceptable toxicity effects to aquatic organisms.

11.3 Cyanide

Similar to cadmium, we expect that the change to the cyanide standard will continue to provide at least an equivalent level of environmental protection, even if the proposed changes reduce regulatory burden. Free cyanide comprises only a portion of all cyanide that may exist in surface waters. The EPA NRWQC for free cyanide was based on toxicological and chemical data that indicated that the more bioavailable and, therefore, more toxic form of cyanide is free cyanide (cyanide that is not bound to organic or other matter in the water column). Since the existing standard of 5 ug/L as total cyanide provides a protective threshold that is more stringent (overprotective) than the toxicological and chemical information used to develop the threshold as free cyanide would warrant, the proposed modification of the existing standard does not result in an environmental impact. In other words, by modifying the existing standard to include analysis as free cyanide, the resulting protective threshold is being set to what was intended by the 1985 EPA NRWQC.

11.4 1,4-Dioxane

The proposed codification of the 1,4-dioxane standard could contribute to the ongoing protection of human health by increasing the potential for the formal assessment of water bodies for 1,4-dioxane impairment. Impairment could lead to the development of a TMDL that compels broader regulatory protections and corrective actions that result in increased human health protections. The importance of this benefit is underscored by the fact that 1,4-dioxane is classified by EPA as a likely human carcinogen. While the benefits to human health associated with the regulation of 1,4-dioxane in wastewater, stormwater, and waste management permits are likely quite substantial, we do not provide monetary estimates in this document as these benefits are ongoing (as ITVs) and are not a result of the current proposed action. However, we recognize the importance of regulating 1,4-dioxane in the environment and want to emphasize the significance of formalizing the ITV into the rules.

11.5 *E. coli*

Information provided by a regional environmental advocacy group suggests *E. coli* using the Colilert method would be a more accessible test and provide a modest cost savings over using fecal coliform with membrane filtration. This savings may allow them to expand their sampling efforts. If there is increased sample collection, it could allow more precise determination of waterbody impairment.

The Division believes the proposed changes will maintain surface water protections in the short term, protect against potential future water quality degradation, and lay the groundwork for more accurate impairment designations and associated protective measures in the long term. However, it is not possible to determine the absolute improvement in water quality that will result from the revised

standards with the available data. Therefore, the expected environmental benefits cannot be monetized for purposes of this analysis. The State will not receive the full value of the rule changes until the revised standards are incorporated into permits, affected facilities upgrade wastewater treatment facilities (if applicable), waterbodies are assessed against the new standards, and aquatic communities respond to the positive changes in the form of reduced mortality, improved reproduction, and enhanced biodiversity.

12. INCORPORATING ENVIRONMENTAL JUSTICE INTO RIAS

DEQ's mission is to "provide science-based environmental stewardship for the health and prosperity of all North Carolinians." One of the ways DWR fulfills this mission is during rulemaking, where DWR is required to consider the economic impacts of proposed regulations to potentially affected parties. The resulting document is called a Regulatory Impact Analysis, or RIA – an example of which you are reading right now.

An RIA is a tool used to identify, quantify, monetize, and communicate the anticipated effects of the proposed rule. It is a structured evaluation of the costs and benefits of regulation. The RIA informs decision-making, improves rule design, promotes transparency, and conveys information about potential impacts. The RIA may include impacts on time, expenditures, revenue, savings, efficiencies, public health, and ecosystem services and remediation.

One area that DWR is currently working to improve upon -- and which is in direct support of our mission to provide stewardship for ALL North Carolinians -- is to intentionally and systematically integrate socioeconomic, race and ethnicity considerations into the RIA process. These components come under the umbrella of "environmental justice." The U.S. EPA defines environmental justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

DWR is actively pursuing opportunities to advance our knowledge and practice in the area of environmental justice through collaboration with area universities as well as with DEQ's Environmental Justice Program[27]. Through these collaborations, we are seeking information on the broader considerations underlying incorporating environmental justice into rulemaking:

- How is social, economic, and environmental equity being incorporated into permitting, and can that model be applied to the rulemaking process?
- Are there best practices that should be integrated into DWR's development of RIAs to identify and account for equity?
- What resources exist to help DWR carry out robust examinations concerning equity during rulemaking?
- How prevalent is implicit bias in external data sources that are used for evaluating cost-benefit impacts of environmental regulation? For example, are low-income or minority communities

[27] https://deq.nc.gov/outreach-education/environmental-justice

systematically underrepresented in contingent valuation surveys, toxics release tracking databases, or recreation trip estimates? Are there methods to account for this in an RIA?
- Through an examination of past RIAs, is it possible to identify commonalities among them? For example, do we tend to undervalue benefits of proposed environmental regulation? Do we undervalue costs associated with maintaining the status quo?

With future rulemakings, it is our goal to be able to address questions more targeted to a particular rule change, such as:

- What are the demographics (race, economic status, geography) of the population exposed to or affected by the problem the rule is intended to address? This information will inform policy/rule decisions as well as outreach strategy during the public comment period.
- Is there a history of related issues in a particular community impacted by the proposed rulemaking?
- What is the expected future distribution of impacts on environmental justice communities?
- How can the rule be designed to optimize its implementation in various communities? This would presumably require early coordination during the rulemaking process with local governments in impacted communities.

DWR did not have the resources available during development of this RIA to include a meaningful environmental justice analysis, so we did not attempt to draw conclusions regarding impacts from the proposed rule changes. However, we wanted to use this opportunity to convey our intention of incorporating environmental justice analyses into future rulemakings. We anticipate consulting with the DEQ Environmental Justice and Equity Advisory Board[28] to assist with recommendations on environmental justice and equity issues raised during future rulemakings.

13. ALTERNATIVES ANALYSIS

To provide additional context about how DEQ arrived at these particular recommendations, DEQ analyzed multiple alternatives to the proposed rulemaking.

Section 303(c)(1) of the Clean Water Act requires that states and tribes evaluate and revise, as necessary, water quality standards at least once every three years. As part of the Triennial Review DEQ assessed EPA's revised NRWQC for numerous areas including scientific confidence, public interest, feasibility of implementation, and potential to improve water quality as compared to current permitting and regulatory baselines. Staff conducted a thorough review of the NRWQC and either accepted or declined to recommend each criteria for rulemaking at this time. Each of these decisions and their combinations can be considered an alternative to the proposed rulemaking.

DEQ concluded that each of the standards included in the proposed rulemaking should be adopted at this time for the reasons that are discussed in the "Rationale" section for each parameter. Each of the proposed standards will allow North Carolina to better protect human health and aquatic life, thereby continuing to meet the objectives of the Clean Water Act, or reduce undue regulatory burdens based

[28] https://deq.nc.gov/outreach-education/environmental-justice/secretarys-environmental-justice-and-equity-board

on an updated understanding of aquatic life toxicity sensitivity. In addition, the potential benefits to the environment, human health, regulated parties, and DEQ are expected to outweigh the potential costs to regulated parties and DEQ for each parameter.

In addition to the parameters included in the proposed rulemaking, DEQ considered the following parameters:

- Aluminum (metal) – This NRWQC was published by EPA in December 2018. Adoption of this criteria would be a new surface water quality standard that would apply to all Class-C freshwaters for the protection of aquatic life. Staff concluded that adoption at this time is not recommended due to uncertainty regarding the scientific basis of the criteria, how to best adapt the model used to calculate the criteria, and whether its adoption as a standard would lead to water quality improvements that justify the expense of implementation.

- Apply *E. coli* recreational bacteria standard statewide – As discussed in Section 10, DEQ considered the feasibility of applying the proposed *E. coli* recreational bacterial standard statewide as opposed to limiting it to the 19 counties within the Asheville Regional Office area. In that scenario, *E. coli* would replace fecal coliform as the water quality pathogen indicator for primary recreation (Class B) waters across the state. This idea was rejected primarily due to the lack of equipment, materials, laboratory space, and staffing resources needed at the DWR central laboratory to analyze primary recreation samples for *E. coli* and secondary recreation samples for fecal coliform bacteria. Also of concern is the number of commercial laboratories certified to run *E. coli* analyses and those laboratories' capability to run *E. coli* and fecal coliform analyses concurrently. In addition, there are numerous logistical challenges associated with administration of DEQ permitting programs that currently use fecal coliform as their pathogen indicator.

- Acrolein (herbicide) – This would be a new surface water quality standard that would apply to all Class C freshwaters for the protection of aquatic life. Staff concluded that adoption at this time is not recommended due to uncertainty as to whether its adoption as a standard would lead to water quality improvements that justify the expense of implementation.

- Cyanotoxins – In 2019, EPA issued recommendations for water quality criteria and swimming advisory values for two cyanotoxins. Algal blooms caused by cyanobacteria sometimes produce cyanotoxins at concentrations that can be harmful to people participating in recreational water-related activities such as swimming. Staff concluded that implementation of this standard would be infeasible at this time, in part, due to expenses associated with outfitting the DWR laboratories with equipment, space, and staffing to carry out the required analyses.

- Ammonia – This would be a new surface water quality standard that would apply to all Class-C freshwaters for the protection of aquatic life. Staff concluded that adoption at this time is not recommended due to the uncertainty as to whether its adoption as a standard would result in water quality improvements that justify the expense of implementation. Preliminary reviews suggest that the majority of costs would be incurred by smaller wastewater system operators whose contribution to ammonia levels in surface water is small in comparison to larger dischargers. In addition, the NPDES wastewater program already implements an ammonia toxicity permitting

policy that is used for establishing ammonia permit limits.

- Human health criteria calculations – EPA revised its human health criteria calculation matrix which provides cancer potency factors, reference doses, relative source contributions, fish consumption rates, and equations used to derive human health criteria. Staff concluded that adoption of these revised criteria is premature due to low scientific confidence in some of the variables and uncertainty about whether these changes would result in water quality improvements that would justify additional costs to the regulated community.

As a whole, the adoption of these additional NRWQC as water quality standards would result in a substantial impact to DEQ and the regulated community without reasonable assurance that such costs would be justified by benefits to water quality or human health. For these reasons, DEQ is not recommending that they be adopted as standards at this time.

APPENDIX I REFERENCES

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2. *For background information about EPA National Recommended Water Quality Criteria:* https://www.epa.gov/wqc/national-recommended-water-quality-criteria-tables.

3. *For more in-depth information about water quality standards:* EPA Water Quality Standards Handbook https://www.epa.gov/wqs-tech/water-quality-standards-handbook.

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5. *For information about NC DEQ Ambient Monitoring Program:* https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/ecosystems-branch/monitoring-coalition-program

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13. *For information about EPA aquatic life criterion for selenium:* https://www.epa.gov/wqc/aquatic-life-criterion-selenium

14. *For information on selenium levels in NC lakes:* Jessica E. Brandt, Emily S. Bernhardt, Gary S. Dwyer, Richard T. Di Giulio. Selenium Ecotoxicology in Freshwater Lakes Receiving Coal Combustion Residual Effluents: A North Carolina Example**.** *Environmental Science & Technology*, 2017; Vol. 51, Issue 4,

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16. *For information on the sources of selenium to the environment:* https://pubs.usgs.gov/pp/1802/q/pp1802q.pdf

17. *For information on the U.S. EPA criterion for selenium*: U.S. EPA Document # EPA 822-F-16-005 "Aquatic Life Ambient Water Quality Criterion for Selenium in Freshwater 2016 – Fact Sheet" https://www.epa.gov/sites/production/files/2016-06/documents/se_2016_fact_sheet_final.pdf

18. *For information about the DEQ 2014 Triennial Review Fiscal Analysis:* https://files.nc.gov/ncosbm/documents/files/DENR10082014.pdf

19. *For information on EPA cadmium water quality criterion:* https://www.epa.gov/sites/production/files/2016-03/documents/cadmium-final-factsheet.pdf

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23. *For information about* 2012 *Recreational Water Quality Criteria* (EPA 820-F-12-058)

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Additional Resources

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Appendix II.

NPDES wastewater permitted facilities with limits (WQBEL or TBEL) or monitoring for 1,4-dioxane

As of Jan. 2021

Permit Number	Owner and Facility Name	County Name	Monitoring only?
NC0001112	Inv Performance Surfaces LLC - Invista Wilmington	New Hanover	Y
NC0001228	Global Nuclear Fuel - Americas LLC - GNF-A Wilmington-Castle Hayne WWTP	New Hanover	Y
NC0001899	Moncure Holdings West LLC - Moncure Holdings West WWTP	Chatham	Y
NC0003573	The Chemours Company Fc LLC - Chemours Company-Fayetteville Works	Bladen	Y
NC0003719	Dak Americas LLC - Cedar Creek Site	Cumberland	Y
NC0003794	Corning, Inc. - Wilmington Fiber Optic Facility	New Hanover	Y
NC0003875	Elementis Chromium Inc - Castle Hayne Plant	New Hanover	Y
NC0023868	City of Burlington - Eastside WWTP	Alamance	Y
NC0024147	City Of Sanford - Big Buffalo WWTP	Lee	Y
NC0024210	City of High Point - East Side WWTP	Guilford	Y
NC0024881	City of Reidsville - Reidsville WWTP	Rockingham	Y
NC0026123	City of Asheboro - Asheboro WWTP	Randolph	Y
NC0027065	Archer Daniels Midland Company - Southport Manufacturing Facility	Brunswick	Y
NC0047384	City of Greensboro - T.Z. Osborne WWTP	Guilford	Y
NC0080853	Nokia of America Corporation - Salem Business Park remediation site	Forsyth	Y
NC0082295	Fortron Industries LLC - Fortron Industries	New Hanover	Y
NC0083658	Daikin Applied Americas Inc - HeatCraft Groundwater Remediation Site	New Hanover	Y
NC0088838	Radiator Specialty Company - Radiator Specialty Company	Union	

Appendix III.

NPDES wastewater permitted facilities with limits (WQBEL or TBEL) or monitoring for Selenium

As of Jan. 2021

Permit Number	Facility Name	Owner Name	Permit Type	Monitor_Only?
NC0000272	Canton Mill	Blue Ridge Paper Products Inc	Ind Process & Comm WW Discharge	Yes
NC0000396	Asheville Steam Electric Power Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	
NC0001422	Sutton Steam Electric Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	
NC0001899	Moncure Holdings West WWTP	Moncure Holdings West LLC	Ind Process & Comm WW Discharge	
NC0003255	Aurora Mine	PCS Phosphate Company Inc	Ind Process & Comm WW Discharge	
NC0003417	Lee Steam Electric Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	Yes
NC0003425	Roxboro Steam Electric Power Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	
NC0003433	Cape Fear Steam Electric Power Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	
NC0003468	Dan River Combined Cycle	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	Yes
NC0003875	Castle Hayne Plant	Elementis Chromium Inc	Ind Process & Comm WW Discharge	Yes
NC0004626	PPG Industries Fiber Glass Products, Inc.	Electric Glass Fiber America LLC	Ind Process & Comm WW Discharge	Yes
NC0004774	Buck Steam Station	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	Yes
NC0004961	Riverbend Steam Station	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	
NC0004979	Plant Allen Steam Station	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	
NC0004987	Marshall Steam Station	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	
NC0005088	Rogers Energy Complex	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	
NC0005258	SGL Carbon Corporation	Sgl Carbon LLC	Ind Process & Comm WW Discharge	Yes
NC0005363	Weatherspoon Steam Electric Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	Yes
NC0006351	Venator Chemicals, LLC	Venator Chemicals LLC	Ind Process & Comm WW Discharge	
NC0020451	West Jefferson WWTP	Town of West Jefferson	Municipal Wastewater Discharge, < 1MGD	Yes
NC0020559	Henderson WRF	City of Henderson	Municipal Wastewater Discharge, Large	Yes
NC0020737	Pilot Creek WWTP	City of Kings Mountain	Municipal Wastewater Discharge, Large	
NC0024279	Southeast WWTP	City of Conover	Municipal Wastewater Discharge, < 1MGD	
NC0024406	Belews Creek Steam Station	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	

NC0025305	UNC Cogeneration Facility	UNC At Chapel Hill	Ind Process & Comm WW Discharge	Yes
NC0036269	Rocky River WWTP	Water and Sewer Authority of Cabarrus County	Municipal Wastewater Discharge, Large	Yes
NC0038377	Mayo Steam Electric Power Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	
NC0047384	T.Z. Osborne WWTP	City of Greensboro	Municipal Wastewater Discharge, Large	
NC0047562	Hamlet WWTP	City of Hamlet	Municipal Wastewater Discharge, Large	Yes
NC0083909	Rodanthe/Waves/Salvo Reverse Osmosis WTP	Dare County	Water Plants and Water Conditioning Discharge	Yes
NC0089451	former Cates Brinery	Addis Cates Company Inc	Groundwater Remediation Discharge	
NC0089621	Novozymes NA, Inc.	Novozymes North America Inc	Ind Process & Comm WW Discharge	
NC0089702	Brightleaf on Main	Brightleaf Durham Associates LLC	Groundwater Remediation Discharge	
NC0089915	Chemours Company-Fayetteville Works	The Chemours Company Fc LLC	Ind Process & Comm WW Discharge	Yes
NC0004944	Edge Water Treating, LLC	Salisbury Investments I LLC	Ind Process & Comm WW Discharge	

Appendix IV.

NPDES wastewater permitted facilities with limits (WQBEL or TBEL) or monitoring for Cadmium

As of Jan. 2021

Permit Number	Facility Name	Owner Name	Permit Type	Monitor only?
NC0000311	M-B Industries WWTP	M-B Industries Inc	Ind Process & Comm WW Discharge	
NC0000396	Asheville Steam Electric Power Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	Y
NC0001121	Danaher Sensors and Controls	Specialty Product Technologies	Ind Process & Comm WW Discharge	
NC0001228	GNF-A Wilmington-Castle Hayne WWTP	Global Nuclear Fuel - Americas LLC	Ind Process & Comm WW Discharge	
NC0001422	Sutton Steam Electric Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	Y
NC0001881	Phillips Plating Company	Phillips Plating Company Inc	Ind Process & Comm WW Discharge	
NC0001899	Moncure Holdings West WWTP	Moncure Holdings West LLC	Ind Process & Comm WW Discharge	
NC0003344	Wallace Chicken Processing Plant	House of Raeford Farms Inc	Ind Process & Comm WW Discharge	Y
NC0003417	Lee Steam Electric Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	Y
NC0003433	Cape Fear Steam Electric Power Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	Y
NC0003450	Wallace Regional WWTP	Town of Wallace	Municipal Wastewater Discharge, Large	Y
NC0003468	Dan River Combined Cycle	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	Y
NC0003760	E.I. DuPont Kinston Plant	Dupont Industrial Biosciences USA LLC	Ind Process & Comm WW Discharge	Y
NC0004774	Buck Steam Station	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	Y
NC0004944	Edge Water Treating, LLC	Salisbury Investments I LLC	Ind Process & Comm WW Discharge	
NC0004961	Riverbend Steam Station	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	
NC0004979	Plant Allen Steam Station	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	Y
NC0004987	Marshall Steam Station	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	Y
NC0005088	Rogers Energy Complex	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	Y
NC0005363	Weatherspoon Steam Electric Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	Y
NC0020401	Northeast WWTP	City of Hickory	Municipal Wastewater Discharge, Large	Y
NC0020559	Henderson WRF	City of Henderson	Municipal Wastewater Discharge, Large	Y

NC0021369	Columbus WWTP	Town of Columbus	Municipal Wastewater Discharge, < 1MGD	
NC0021491	Dutchman Creek WWTP	Town of Mocksville	Municipal Wastewater Discharge, < 1MGD	
NC0023736	Gunpowder Creek WWTP	City of Lenoir	Municipal Wastewater Discharge, Large	
NC0023981	Lower Creek WWTP	City of Lenoir	Municipal Wastewater Discharge, Large	
NC0024244	Long Creek WWTP	City of Albemarle	Municipal Wastewater Discharge, Large	
NC0024252	Northeast WWTP	City of Conover	Municipal Wastewater Discharge, Large	Y
NC0024406	Belews Creek Steam Station	Duke Energy Carolinas LLC	Ind Process & Comm WW Discharge	
NC0025305	UNC Cogeneration Facility	UNC At Chapel Hill	Ind Process & Comm WW Discharge	Y
NC0025496	Lincolnton WWTP	City of Lincolnton	Municipal Wastewater Discharge, Large	
NC0026441	Siler City WWTP	Town of Siler City	Municipal Wastewater Discharge, Large	
NC0026689	Denton WWTP	Town of Denton	Municipal Wastewater Discharge, < 1MGD	Y
NC0037834	Archie Elledge WWTP	City of Winston-Salem	Municipal Wastewater Discharge, Large	Y
NC0038377	Mayo Steam Electric Power Plant	Duke Energy Progress LLC	Ind Process & Comm WW Discharge	
NC0040011	Yanceyville WWTP	Town of Yanceyville	Municipal Wastewater Discharge, < 1MGD	Y
NC0040797	Henry Fork WWTP	City of Hickory	Municipal Wastewater Discharge, Large	Y
NC0044725	Laurinburg Industrial WWTP	Laurinburg-Maxton Airport Commission	Municipal Wastewater Discharge, Large	Y
NC0055786	Lexington Regional WWTP	City of Lexington	Municipal Wastewater Discharge, Large	
NC0056863	Rose Hill WWTP	Town of Rose Hill	Municipal Wastewater Discharge, < 1MGD	Y
NC0065081	Roxboro Plant	CPI USA North Carolina LLC	Ind Process & Comm WW Discharge	
NC0075281	Craven County Wood Energy	Craven County Wood Energy, LP	Ind Process & Comm WW Discharge	Y
NC0089109	American Zinc Products, LLC	American Zinc Products LLC	Ind Process & Comm WW Discharge	
NC0089621	Novozymes NA, Inc.	Novozymes North America Inc	Ind Process & Comm WW Discharge	
NC0089672	West Stonewall Street Brownfields site	Gslh Charlotte Realty Holdings LLC	Groundwater Remediation Discharge	Y
NC0089915	Chemours Company-Fayetteville Works	The Chemours Company Fc LLC	Ind Process & Comm WW Discharge	Y
NC0089923	Baxter Street remediation site	Charlotte Water	Water Plants and Water Conditioning Discharge	Y

Appendix V.

NPDES wastewater permitted facilities with limits or monitoring (WQBEL or TBEL) for Cyanide

As of Jan. 2021

Permit Number	Facility Name	Permit Type	Monitor_Only?
NC0000311	M-B Industries WWTP	Ind Process & Comm WW Discharge	
NC0001121	Danaher Sensors and Controls	Ind Process & Comm WW Discharge	
NC0001228	GNF-A Wilmington-Castle Hayne WWTP	Ind Process & Comm WW Discharge	
NC0001881	Phillips Plating Company	Ind Process & Comm WW Discharge	
NC0001899	Moncure Holdings West WWTP	Ind Process & Comm WW Discharge	
NC0002305	Lear Corporation WWTP	Ind Process & Comm WW Discharge	
NC0003573	Chemours Company-Fayetteville Works	Ind Process & Comm WW Discharge	
NC0004308	Badin Business Park	Ind Process & Comm WW Discharge	
NC0004944	Edge Water Treating, LLC	Ind Process & Comm WW Discharge	
NC0004952	CNA Holding LLC - Shelby	Ind Process & Comm WW Discharge	
NC0020737	Pilot Creek WWTP	Municipal Wastewater Discharge, Large	Yes
NC0020834	Warrenton WWTP	Municipal Wastewater Discharge, Large	
NC0021181	Belmont WWTP	Municipal Wastewater Discharge, Large	Yes
NC0021229	Old Fort WWTP	Municipal Wastewater Discharge, < 1MGD	Yes
NC0021369	Columbus WWTP	Municipal Wastewater Discharge, < 1MGD	
NC0021407	Highlands WWTP	Municipal Wastewater Discharge, Large	
NC0021709	Jefferson WWTP	Municipal Wastewater Discharge, < 1MGD	
NC0023736	Gunpowder Creek WWTP	Municipal Wastewater Discharge, Large	
NC0023981	Lower Creek WWTP	Municipal Wastewater Discharge, Large	Yes
NC0024333	Monroe WWTP	Municipal Wastewater Discharge, Large	
NC0024538	First Broad River WWTP	Municipal Wastewater Discharge, Large	
NC0024945	Irwin Creek WWTP	Municipal Wastewater Discharge, Large	
NC0025011	Elizabeth City WWTP	Municipal Wastewater Discharge, Large	
NC0025321	Waynesville WWTP	Municipal Wastewater Discharge, Large	Yes
NC0025348	New Bern WWTP	Municipal Wastewater Discharge, Large	Yes
NC0025577	Red Springs WWTP	Municipal Wastewater Discharge, Large	Yes
NC0026824	SGWASA WWTP	Municipal Wastewater Discharge, Large	
NC0027065	Southport Manufacturing Facility	Ind Process & Comm WW Discharge	
NC0028916	Troy WWTP	Municipal Wastewater Discharge, Large	

NC0031879	Corpening Creek WWTP	Municipal Wastewater Discharge, Large	
NC0037834	Archie Elledge WWTP	Municipal Wastewater Discharge, Large	Yes
NC0040011	Yanceyville WWTP	Municipal Wastewater Discharge, < 1MGD	Yes
NC0045993	ATI Specialty Materials - Monroe Plant	Ind Process & Comm WW Discharge	
NC0058548	Star WWTP	Municipal Wastewater Discharge, < 1MGD	
NC0074268	Crowders Creek WWTP	Municipal Wastewater Discharge, Large	Yes
NC0083089	Bogue Banks Water Corp WTP	Water Plants and Water Conditioning Discharge	Yes
NC0088650	Mainland WTP	Water Plants and Water Conditioning Discharge	
NC0088811	PPD Groundwater Remediation Site	Groundwater Remediation Discharge	Yes
NC0089800	Jones County WTP	Water Plants and Water Conditioning Discharge	Yes
NC0089915	Chemours Company-Fayetteville Works	Ind Process & Comm WW Discharge	Yes

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

15A NCAC 02B .0202 DEFINITIONS

The definition of any word or phrase used in this Section shall be the same as given in G.S. 143, Article 21. The following words and phrases, which are not defined in this article, shall be interpreted as follows:

(1) "Acute toxicity to aquatic life" means lethality or other harmful effects sustained by either resident aquatic populations or indicator species used as test organisms in a controlled toxicity test due to a short-term exposure (relative to the life cycle of the organism) of 96 hours or less to a specific chemical or mixture of chemicals (as in an effluent). Acute toxicity shall be determined using the following procedures:

(a) for specific chemical constituents or compounds, acceptable levels shall be equivalent to a concentration of one-half or less of the Final Acute Value (FAV) as determined according to "Guidelines for Deriving Numerical Water Quality Criteria for the Protection of Aquatic Life and its Uses" published by the Environmental Protection Agency and referenced in the Federal Register (50 FR 30784, July 29, 1985) which is incorporated by reference including subsequent amendments and editions.

(b) for specific chemical constituents or compounds for which values described under Sub-Item (a) of this Item cannot be determined, acceptable levels shall be equivalent to a concentration of one-third or less of the lowest available LC50 value.

(c) for effluents, acceptable levels shall be defined as no statistically measurable lethality (99 percent confidence level using Student's t-test) during a specified exposure period. Concentrations of exposure shall be based on permit requirements and procedures in accordance with 15A NCAC 02H .1110.

(d) in instances where detailed dose response data indicate that levels of acute toxicity are different from those defined in this Rule, the Director may determine on a case-by-case basis an alternate acceptable level through statistical analyses of the dose response in accordance with 15A NCAC 02H .1110.

(2) "Acute to Chronic Ratio" or "ACR" means the ratio of acute toxicity expressed as an LC50 for a specific toxicant or an effluent to the chronic value for the same toxicant or effluent.

(3) "Agricultural uses" means the use of waters for stock watering, irrigation, and other farm purposes.

(4) "Applicator" means any person, firm, corporation, wholesaler, retailer, or distributor; any local, State, or federal governmental agency; or any other person who applies fertilizer to the land of a consumer or client or to land that they own, lease, or otherwise hold rights.

(5) "Approved treatment," as applied to water supplies, means treatment approved by the Division in accordance with 15A NCAC 18C .0301 through .0309, as authorized by G.S. 130A-315 and G.S. 130A-317.

(6) "Attainable water uses" means uses that can be achieved by the imposition of effluent limits and cost effective and reasonable best management practices (BMP) for nonpoint source control.

(7) "Average" means the arithmetical average of the analytical results of all representative samples taken under prevailing environmental conditions during a specified period (for example: daily, weekly, or monthly).

(8) "Best Management Practice" or "BMP" means a structural or nonstructural management-based practice used singularly or in combination to reduce point source or nonpoint source inputs to receiving waters in order to achieve water quality protection goals.

(9) "Best usage" or "Best use" of waters, as specified for each class, means those uses as determined by the Environmental Management Commission in accordance with the provisions of G.S. 143-214.1.

(10) "Bioaccumulation factor" or "BAF" means a unitless value that describes the degree to which substances are taken up or accumulated into tissues of aquatic organisms from water directly and from food or other ingested materials containing the accumulated substances, and is measured as a ratio of a substance's concentration in tissue versus its concentration in water in situations where exposure to the substance occurs from both water and the food chain.

(11) "Bioconcentration factor" or "BCF" means a unitless value that describes the degree to which substances are absorbed or concentrated into tissues of aquatic organisms from water directly and is measured as a ratio of substance's concentration in tissue versus its concentration in water in situations where exposure to the substance occurs from water only.

(12) "Biological integrity" means the ability of an aquatic ecosystem to support and maintain a balanced and indigenous community of organisms having species composition, diversity, population densities, and functional organization similar to that of reference conditions.

(13) "Buffer" means a natural or vegetated area through which stormwater runoff flows in a diffuse manner so that the runoff does not become channelized and which provides for infiltration of the runoff and filtering of pollutants.

(14) "Chronic toxicity to aquatic life" means any harmful effect sustained by either resident aquatic populations or indicator species used as test organisms in a controlled toxicity test due to long-term exposure (relative to the life cycle of the organism) or exposure during a substantial portion of the duration of a sensitive period of the life cycle to a specific chemical substance or mixture of chemicals (as in an effluent). In absence of extended periods of exposure, early life stage or reproductive toxicity tests may be used to define chronic impacts.

(15) "Chronic value for aquatic life" means the geometric mean of two concentrations identified in a controlled toxicity test as the No Observable Effect Concentration (NOEC) and the Lowest Observable Effect Concentration (LOEC).

(16) "Commercial applicator" means any person, firm, corporation, wholesaler, retailer, distributor, or any other person who for hire or compensation applies fertilizer to the land of a consumer or client.

(17) "Concentration" means the mass of a substance per volume of water and, for the purposes of this Section, shall be expressed as milligrams per liter (mg/l), micrograms per liter (ug/l), or nanograms per liter (ng/l).

(18) "Contiguous" means those wetlands landward of the mean high water line or normal water level and within 575 feet of classified surface waters that appear as solid blue lines on the most recently published versions of U.S.G.S. 1:24,000 (7.5 minute) scale topographic maps, which are available at no cost at http://www.usgs.gov/pubprod/.

(19) "Critical area" means the area adjacent to a water supply intake or reservoir where risk associated with pollution is greater than risk associated with pollution from the remaining portions of the watershed. The boundary of a critical area is defined as:

(a) extending either 1/2 mile in a straight line fashion upstream from and draining to the normal pool elevation of the reservoir in which the intake is located or to the ridge line of the watershed, whichever is nearest the normal pool elevation of the reservoir;

(b) extending either 1/2 mile in a straight line fashion upstream from and draining to the intake (or other appropriate downstream location associated with the water supply) located directly in the stream or river (run-of-the-river) or to the ridge line of the watershed, whichever is nearest the intake; or

(c) extending a different distance from the reservoir or intake as adopted by the Commission during the reclassification process pursuant to Rule .0104 of this Subchapter.

Since WS-I watersheds are essentially undeveloped, establishment of a critical area is not required.

(20) "Cropland" means agricultural land that is not covered by a certified animal waste management plan and is used for growing corn, grains, oilseed crops, cotton, forages, tobacco, beans, or other vegetables or fruits.

(21) "Designated Nonpoint Source Agency" means an agency specified by the Governor in the North Carolina Nonpoint Source Management Program, as approved by the Environmental Protection Agency pursuant to the 1987 amendments to the federal Clean Water Act 33 U.S.C. 1329 that established Section 319 Nonpoint source management programs.

(22) "Director" means the Director of the Division.

(23) "Discharge" means the addition of any man-induced waste effluent either directly or indirectly to State surface waters.

(24) "Division" means the Division of Water Resources or its successors.

(25) "Domestic wastewater discharge" means the discharge of sewage, non-process industrial wastewater, other domestic wastewater, or any combination of these items. Domestic wastewater

includes, but is not limited to, liquid waste generated by domestic water using fixtures and appliances from any residence, place of business, or place of public assembly, even if it contains no sewage. Examples of domestic wastewater include once-through non-contact cooling water, seafood packing facility discharges, and wastewater from restaurants.

(26) "Effluent channel" means a discernable confined and discrete conveyance that is used for transporting treated wastewater to a receiving stream or other body of water, as provided in Rule .0228 of this Section.

(27) "Existing uses" mean uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards.

(28) "Fertilizer" means any substance containing nitrogen or phosphorus that is used primarily as plant food.

(29) "Fishing" means the taking of fish by recreational or commercial methods, the consumption of fish or shellfish, the propagation of fish, or the propagation of other aquatic life as is necessary to protect the biological integrity of the environment for fish.

(30) "Forest vegetation" means the plants of an area that grow in disturbed or undisturbed conditions in wooded plant communities in any combination of trees, saplings, shrubs, vines, and herbaceous plants, including mature and successional forests and cutover stands.

(31) "Freshwater" means all waters that under natural conditions have a chloride ion content of 500 mg/l or less.

(32) "Industrial discharge" means the discharge of industrial process treated wastewater or wastewater other than sewage. Stormwater shall not be considered to be an industrial wastewater unless it is contaminated with industrial wastewater. Industrial discharge includes:

(a) wastewater resulting from any process of industry or manufacture or from the development of any natural resource;

(b) wastewater resulting from processes of trade or business, including wastewater from laundromats and car washes, but not wastewater from restaurants; and

(c)[A1] for the purpose of prohibiting discharges to waters classified as Water Supply (WS) in accordance with Rules .0212, .0214, .0215, .0216, and .0218 of this Section, wastewater discharged from a municipal wastewater treatment plant ~~requiring~~ required to administer a pretreatment ~~program.~~ program pursuant to 15A NCAC 02H .0904.

(33) "Land-disturbing activity" means any use of the land that results in a change in the natural cover or topography that may cause or contribute to sedimentation.

(34) "LC50" means that concentration of a toxic substance that is lethal or immobilizing to 50 percent of the sensitive aquatic toxicity testing species tested during a specified exposure period, as required by NPDES permit, under aquatic conditions characteristic of the receiving waters. Sensitive species for aquatic toxicity testing is defined by Subparagraph (50) of this Rule.

(35) "Lentic[A2]" means an aquatic ecosystem with standing or slow flowing water such as a lake, pond, or reservoir.

~~(35)~~(36) "Local government" means a city or county in singular or plural as defined in G.S. 160A-1(2) and G.S. 158A-10.

(37) "Lotic[A3]" means an aquatic ecosystem with rapidly flowing water such as a stream or river.

~~(36)~~(38) "Lower piedmont and coastal plain waters" means those waters of the Catawba River Basin below Lookout Shoals Dam; the Yadkin River Basin below the junction of the Forsyth, Yadkin, and Davie County lines; and all of the waters of Cape Fear, Lumber, Roanoke, Neuse, Tar-Pamlico, Chowan, Pasquotank, and White Oak River Basins; except tidal salt waters which are assigned S classifications.

~~(37)~~(39) "MF" means the membrane filter procedure for bacteriological analysis.

~~(38)~~(40) "Mixing zone" means a region of the receiving water in the vicinity of a discharge within which dispersion and dilution of constituents in the discharge occurs. Zones shall be subject to conditions established in accordance with Rule .0204(b) of this Section.

~~(39)~~(41) "Mountain and upper piedmont waters" means all of the waters of the Hiwassee; Little Tennessee, including the Savannah River drainage area; French Broad; Broad; New; and Watauga River Basins; and those portions of the Catawba River Basin above Lookout Shoals Dam and the Yadkin River Basin above the junction of the Forsyth, Yadkin, and Davie County lines.

~~(40)~~(42) "Nonpoint source pollution" means pollution that enters waters mainly as a result of precipitation and subsequent runoff from lands that have been disturbed by man's activities and includes all sources of water pollution that are not required to have a permit in accordance with G.S. 143-215.1(c).

~~(41)~~(43) "Non-process discharge" means industrial effluent not directly resulting from the manufacturing process. An example is non-contact cooling water from a compressor.

~~(42)~~(44) "Offensive condition" means any condition or conditions resulting from the presence of sewage, industrial wastes, or other wastes within the waters of the State or along the shorelines thereof that shall either directly or indirectly cause foul or noxious odors, unsightly conditions, or breeding of abnormally large quantities of mosquitoes or other insect pests; damage private or public water supplies or other structures; result in the development of gases which destroy or damage surrounding property, herbage or grasses; cause the impairment of taste such as from fish flesh tainting; or affect the health of any person residing or working in the area.

~~(43)~~(45) "Primary contact recreation" means swimming, diving, skiing, and similar uses involving human body contact with water where such activities take place in an organized or on a frequent basis.

~~(44)~~(46) "Primary nursery area" or "PNA" means tidal saltwaters that provide essential habitat for the early development of commercially important fish and shellfish and are so designated by the Marine Fisheries Commission.

~~(45)~~(47) "Protected area" means the area adjoining and upstream of the critical area in a WS-IV water supply in which protection measures are required. The boundary of a protected area is defined as:

(a) extending either five miles in an as-the-river-runs manner upstream from and draining to the normal pool elevation of the reservoir in which the intake is located or to the ridge line of the watershed, whichever is nearest the normal pool elevation of the reservoir;

(b) extending either 10 miles in an as-the-river-runs manner upstream from and draining to the intake located directly in the stream or river run-of-the-river or to the ridge line of the watershed, whichever is nearest the intake. In some cases the protected area shall encompass the entire watershed; or

(c) extending a different distance from the reservoir or intake as adopted by the Commission during the reclassification process pursuant to Rule .0104 of this Subchapter.

~~(46)~~(48) "Residential development" means buildings for residence such as attached and detached single family dwellings, apartment complexes, condominiums, townhouses, cottages, and their associated outbuildings such as garages, storage buildings, and gazebos.

~~(47)~~(49) "Residuals" has the same meaning as in 15A NCAC 02T .0103.

~~(48)~~(50) "Riparian area" means an area that is adjacent to a body of water.

~~(49)~~(51) "Secondary contact recreation" means wading, boating, other uses not involving human body contact with water, and activities involving human body contact with water where such activities take place on an infrequent, unorganized, or incidental basis.

~~(50)~~(52) "Sensitive species for aquatic toxicity testing" means any species utilized in procedures accepted by the Commission or its designee in accordance with Rule .0103 of this Subchapter, and the following genera:

(a) Daphnia;

(b) Ceriodaphnia;

(c) Salmo;

(d) Pimephales;

(e) Mysidopsis;

(f) Champia;

(g) Cyprinodon;

(h) Arbacia;

(i) Penaeus;

(j) Menidia;

(k) Notropis;

(l) Salvelinus;

(m) Oncorhynchus;

(n) Selenastrum;

(o) Chironomus;

(p) Hyalella;

(q) Lumbriculus.

~~(51)~~(53) "Shellfish culture" means the use of waters for the propagation, storage, and gathering of oysters, clams, and other shellfish for market purposes.

~~(52)~~(54) "Swamp waters" means those waters that are classified as such by the Environmental Management Commission, pursuant to Rule .0101 of this Subchapter, and that have natural characteristics due to topography, such as low velocity, dissolved oxygen, or pH, that are different from streams draining steeper topography.

~~(53)~~(55) "Tidal salt waters" means all waters that have a natural chloride ion content in excess of 500 parts per million.

~~(54)~~(56) "Toxic substance" or "Toxicant" means any substance or combination of substances (including disease-causing agents) that, after discharge and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, has the potential to cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions or suppression in reproduction or growth), or physical deformities in such organisms or their offspring.

~~(55)~~(57) "Trout waters" means those waters that are classified as such by the Environmental Management Commission, pursuant to Rule .0101 of this Subchapter, and have conditions that sustain and allow for natural trout propagation and survival and for year-round maintenance of stocked trout.

~~(56)~~(58) "Water dependent structures" means those structures that require access or proximity to or siting within surface waters to fulfill its purpose, such as boat ramps, boat houses, docks, and bulkheads. Ancillary facilities such as restaurants, outlets for boat supplies, parking lots, and commercial boat storage areas are not water dependent structures.

~~(57)~~(59) "Water quality based effluent limits (or limitations) and management practices" mean limits and practices developed by the Division to protect water quality standards and best uses of surface waters, consistent with the requirements of G.S. 143-214.1 and the federal Water Pollution Control Act, as amended.

~~(58)~~(60) "Waters with quality higher than the standards" means waters that the Director determines (pursuant to Rule .0206 of this Section) have the capacity to receive additional pollutant loading and continue to meet applicable water quality standards.

~~(59)~~(61) "Watershed" means a natural area of drainage, including all tributaries contributing to the supply of at least one major waterway within the State, the specific limits of each separate watershed to be designated by the Commission as defined by G.S. 143-213(21).

~~(60)~~(62) "WER" or "Water effect ratio" expresses the difference between the measures of the toxicity of a substance in laboratory waters and the toxicity in site water.

~~(61)~~(63) "Wetlands" are "waters" as defined by G.S. 143-212(6) that are inundated or saturated by an accumulation of surface or ground water at a frequency and duration sufficient to support, and that

under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands do not include prior converted cropland as defined in the National Food Security Act Manual, Fifth Edition, which is hereby incorporated by reference, not including subsequent amendments and editions, and is available free of charge at https://directives.sc.egov.usda.gov/RollupViewer.aspx?hid=29340.

History Note: *Authority G.S. 143-213; 143-214.1; 143-215.3(a)(1);*
Eff. February 1, 1976;
Amended Eff. August 1, 1995; February 1, 1993; August 3, 1992; August 1, 1990;
RRC Objection Eff. July 18, 1996 due to lack of authority and ambiguity;
Amended Eff. August 1, 1998; October 1, 1996;
Readopted Eff. ~~November 1, 2019.~~ November 1, 2019;
Amended Eff. Xxxxx.

15A NCAC 02B .0208 is proposed for amendment as follows:

15A NCAC 02B .0208 STANDARDS FOR TOXIC SUBSTANCES AND TEMPERATURE

(a) Toxic Substances: the concentration of toxic substances, either alone or in combination with other wastes, in surface waters shall not render waters injurious to aquatic life or wildlife, recreational activities, or public health, nor shall it impair the waters for any designated uses. Specific standards for toxic substances to protect freshwater and tidal saltwater uses are listed in Rules .0211 and .0220 of this Section, respectively. The narrative standard for toxic substances and numerical standards applicable to all waters shall be interpreted as follows:

(1) The concentration of toxic substances shall not result in chronic toxicity to aquatic life. Any levels in excess of the chronic value for aquatic life shall be considered to result in chronic toxicity. In the absence of direct measurements of chronic toxicity, the concentration of toxic substances shall not exceed the concentration specified by the fraction of the lowest LC50 value that predicts a no effect chronic level as determined by the use of an acceptable Acute to Chronic Ratio (ACR) in accordance with U.S. Environmental Protection Agency (EPA) "Guidelines for Deriving Numerical Water Quality Criteria for the Protection of Aquatic Life and its Uses." In the absence of an ACR, that toxic substance shall not exceed one-one hundredth (0.01) of the lowest LC50 or, if it is demonstrated that a toxic substance has a half-life of less than 96 hours, the maximum concentration shall not exceed one-twentieth (0.05) of the lowest LC50.

(2) The concentration of toxic substances shall not exceed the level necessary to protect human health through exposure routes of fish tissue consumption, water consumption, recreation, or other route identified for the water body. Fish tissue consumption shall include the consumption of shellfish. These concentrations of toxic substances shall be determined as follows:

(A) For non-carcinogens, these concentrations shall be determined using a Reference Dose (RfD) as published by the EPA pursuant to Section 304(a) of the Federal Water Pollution Control Act as amended, a RfD issued by the EPA as listed in the Integrated Risk Information System (IRIS) file, or a RfD approved by the Director after consultation with the State Health director. Water quality standards or criteria used to calculate water quality based effluent limitations to protect human health through the different exposure routes shall be determined as follows:

(i) Fish tissue consumption:

WQS = (RfD x RSC) x Body Weight / (FCR x BCF)

where:

WQS = water quality standard or criteria;

RfD = reference dose;

RSC = Relative Source Contribution;

FCR = fish consumption rate (based upon 17.5 gm/person-day);

BCF = bioconcentration factor or bioaccumulation factor (BAF), as appropriate.

Pursuant to Section 304(a) of the Federal Water Pollution Control Act as amended, BCF or BAF values, literature values, or site specific bioconcentration data shall be based on EPA publications; FCR values shall be average consumption rates for a 70 Kg adult for the lifetime of the population; alternative FCR values may be used when it is considered necessary to protect localized populations that may be consuming fish at a higher rate; RSC values, when made available through EPA publications pursuant to Section 304(a) of the Federal Clean Water Pollution Control Act to account for non-water sources of exposure may be either a percentage (multiplied) or amount subtracted, depending on whether multiple criteria are relevant to the chemical;

(ii) Water consumption (including a correction for fish consumption):

WQS = (RfD x RSC) x Body Weight / [WCR + (FCR x BCF)]

where:

WQS = water quality standard or criteria;

RfD = reference dose;

RSC = Relative Source Contribution;

FCR = fish consumption rate (based upon 17.5 gm/person-day);

BCF = bioconcentration factor or bioaccumulation factor (BAF), as appropriate;

WCR = water consumption rate (assumed to be two liters per day for adults).

To protect sensitive groups, exposure shall be based on a 10 Kg child drinking one liter of water per day. Standards may also be based on drinking water standards based on the requirements of the Federal Safe Drinking Water Act, 42 U.S.C. 300(f)(g)-1. For non-carcinogens, specific numerical water quality standards have not been included in this Rule because water quality standards to protect aquatic life for all toxic substances for which standards have been considered are more stringent than numerical standards to protect human health from non-carcinogens through consumption of fish. Standards to protect human health from non-carcinogens through water consumption are listed under the water supply classification standards in Rule .0211 of this Section. The equations listed in this Subparagraph shall be used to develop water quality based effluent limitations on a case-by-case basis for toxic substances that are not presently included in the water quality standards. Alternative FCR values may be used when it is necessary to protect localized populations that may be consuming fish at a higher rate;

(B) For carcinogens, the concentrations of toxic substances shall not result in unacceptable health risks and shall be based on a Carcinogenic Potency Factor (CPF). An unacceptable

health risk for cancer shall be more than one case of cancer per one million people exposed (10^{-6} risk level). The CPF is a measure of the cancer-causing potency of a substance estimated by the upper 95 percent confidence limit of the slope of a straight line calculated by the Linearized Multistage Model or other appropriate model according to U.S. Environmental Protection Agency Guidelines, FR 51 (185): 33992-34003; and FR 45 (231 Part V): 79318-79379. Water quality standards or criteria for water quality based effluent limitations shall be calculated using the procedures given in this Part and in Part (A) of this Subparagraph. Standards to protect human health from carcinogens through water consumption are listed under the water supply classification standards in Rules .0212, .0214, .0215, .0216, and .0218 of this Section. Standards to protect human health from carcinogens through the consumption of fish (and shellfish) only shall be applicable to all waters as follows:

(i) Aldrin: 0.05 ng/l;

(ii) Arsenic: 10 ug/l;

(iii) Benzene: 51 ug/l;

(iv) Carbon tetrachloride: 1.6 ug/l;

(v) Chlordane: 0.8 ng/l;

(vi) DDT: 0.2 ng/l;

(vii) Dieldrin: 0.05 ng/l;

(viii) Dioxin: 0.000005 ng/l;

(ix) Heptachlor: 0.08 ng/l;

(x) Hexachlorobutadiene: 18 ug/l;

(xi) Polychlorinated biphenyls (total of all identified PCBs and congeners): 0.064 ng/l;

(xii) Polynuclear aromatic hydrocarbons (total of all PAHs): 31.1 ng/l;

(xiii) Tetrachloroethane (1,1,2,2): 4 ug/l;

(xiv) Tetrachloroethylene: 3.3 ~~ug/L;~~ ug/l;

(xvi) Trichloroethylene: 30 ug/l;

(xvii) Vinyl chloride: 2.4 ~~ug/l.~~ ug/l;

(xviii) 1,4-Dioxane: 80 ug/l.

The values listed in Subparts (i) through ~~(xvii)~~ (xviii) of this Part may be adjusted by the Commission or its designee on a case-by-case basis to account for site-specific or chemical-specific information pertaining to the assumed BCF, FCR, or CPF values or other data.

(b) Temperature: the Commission may establish a water quality standard for temperature for specific water bodies other than the standards specified in Rules .0211 and .0220 of this Section upon a case-by-case determination that thermal discharges to these waters that serve or may serve as a source or receptor of industrial cooling water provide

for the maintenance of the designated best use throughout a portion of the water body. Such revisions of the temperature standard shall be consistent with the provisions of Section 316(a) of the Federal Water Pollution Control Act, as amended. A list of such revisions shall be maintained and made available to the public by the Division.

History Note: *Authority G.S. 143-214.1; 143-215.3(a)(1);*
Eff. February 1, 1976;
Amended Eff. May 1, 2007; April 1, 2003; February 1, 1993; October 1, 1989; January 1, 1985; September 9, 1979;
Readopted Eff. ~~November 1, 2019.~~ November 1, 2019;
Amended Eff. x.

15A NCAC 02B .0211 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 short-term or long-term basis shall be deemed to violate a water quality standard;

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

(4) Chlorophyll a (corrected): 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;

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

(6) Dissolved oxygen: not less than 6.0 mg/l for trout waters; for non-trout 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,~~ mercury, 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,~~ mercury, 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)~~(viii) Silver, dissolved, chronic: WER· 0.06 ug/l;

(d) Selenium, chronic: The standard for chronic selenium has the following components: fish egg/ovary tissue, fish whole body or muscle tissue, and water column (lentic and lotic).

These components shall be used in the following order of preference provided data is available:

(i) Fish egg/ovary tissue;

(ii) Fish whole body or muscle tissue;

(iii) Water column.

Fish tissue concentrations are determined as dry weight and water column concentrations are based on the dissolved fraction of selenium. The chronic selenium standards are as follows:

Component		Magnitude	Duration
Fish tissue	Fish egg/ovary tissue	15.1 mg/kg	Instantaneous
	Fish whole body or muscle tissue	8.5 mg/kg whole body	Instantaneous
		11.3 mg/kg muscle	Instantaneous
Water column	Lentic or Lotic	1.5 ug/l lentic	30-day average
		3.1 ug/l lotic	30-day average

~~(d)~~(e) 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}]~~ WER·[{1.136672-[ln hardness](0.041838)} · e^{0.9789 [ln hardness]-3.345}]	~~0.82~~ 0.83
Cadmium,	~~WER· [{1.136672-[ln hardness](0.041838)} · e^{0.9151[ln~~	~~0.51~~ 0.49

Acute, Trout waters	~~hardness] 3.6236}]~~ WER·[{1.136672-[ln hardness](0.041838)} · e^{0.9789 [ln hardness]-3.866}]	
Cadmium, Chronic	~~WER· [{1.101672 [ln hardness](0.041838)} · e^{0.7998[ln hardness] 4.4451}]~~ WER·[{1.101672-[ln hardness](0.041838)} · e^{0.7977[ln hardness]-3.909}]	~~0.15~~ 0.25
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 (EPA-822-R-07-001)	2.7 NA
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)~~(f) 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, except for selenium 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. xx

15A NCAC 02B .0212 is proposed for amendment as follows:

15A NCAC 02B .0212 FRESH SURFACE WATER QUALITY STANDARDS FOR CLASS WS-I WATERS

The following water quality standards shall apply to surface waters within water supply watersheds classified as WS-I. Water quality standards applicable to Class C waters as described in Rule .0211 of this Section shall also apply to Class WS-I waters.

(1) The best usage of waters classified as WS-I shall be as a source of water supply for drinking, culinary, or food processing purposes for those users desiring maximum protection of their water supplies in the form of the most stringent WS classification, and any best usage specified for Class C waters. Class WS-I waters are waters located on land in public ownership and waters located in undeveloped watersheds.

(2) The best usage of waters classified as WS-I shall be maintained as follows:

(a) Water quality standards in a WS-I watershed shall meet the requirements as specified in Item (3) of this Rule.

(b) Wastewater and stormwater point source discharges in a WS-I watershed shall meet the requirements as specified in Item (4) of this Rule.

(c) Nonpoint source pollution in a WS-I watershed shall meet the requirements as specified in Item (5) of this Rule.

(d) Following approved treatment, as defined in Rule .0202 of this Section, the waters shall meet the Maximum Contaminant Level concentrations considered safe for drinking, culinary, and food-processing purposes that are specified in 40 CFR Part 141 National Primary Drinking Water Regulations and in the North Carolina Rules Governing Public Water Supplies, 15A NCAC 18C .1500, incorporated by reference including subsequent amendments and editions.

(e) Sources of water pollution that preclude any of the best uses on either a short-term or long-term basis shall be deemed to violate a water quality standard.

(f) The Class WS-I classification may be used to protect portions of Class WS-II, WS-III, and WS-IV water supplies. For reclassifications occurring after the July 1, 1992 statewide reclassification, a WS-I classification that is requested by local governments shall be considered by the Commission if all local governments having jurisdiction in the affected areas have adopted a resolution and the appropriate ordinances as required by G.S. 143-214.5(d) to protect the watershed or if the Commission acts to protect a watershed when one or more local governments has failed to adopt protective measures as required by this Sub-Item.

(3) Water quality standards applicable to Class WS-I Waters shall be as follows:

(a) MBAS (Methylene-Blue Active Substances): not greater than 0.5 mg/l to protect the aesthetic qualities of water supplies and to prevent foaming;

(b) Total coliforms shall not exceed 50/100 ml (MF count) as a monthly geometric mean value in watersheds serving as unfiltered water supplies;

(c) Chlorinated phenolic compounds: not greater than 1.0 ug/l to protect water supplies from taste and odor problems from chlorinated phenols;

(d) Solids, total dissolved: not greater than exceed 500 mg/l;

(e) Total hardness: not greater than 100 mg/l as calcium carbonate ($CaCO_3$ or Ca + Mg);

(f) Toxic and other deleterious substances that are non-carcinogens:

(i) Barium: 1.0 mg/l;

(ii) Chloride: 250 mg/l;

(iii) Nickel: 25 ug/l;

(iv) Nitrate nitrogen: 10.0 mg/l;

(v) 2,4-D: 70 ug/l;

(vi) 2,4,5-TP (Silvex): 10 ug/l; and

(vii) Sulfates: 250 mg/l;

(g) Toxic and other deleterious substances that are carcinogens:

(i) Aldrin: 0.05 ng/1;

(ii) Arsenic: 10 ug/l;

(iii) Benzene: 1.19 ug/1;

(iv) Carbon tetrachloride: 0.254 ug/l;

(v) Chlordane: 0.8 ng/1;

(vi) Chlorinated benzenes: 488 ug/l;

(vii) DDT: 0.2 ng/1;

(viii) Dieldrin: 0.05 ng/1;

(ix) Dioxin: 0.000005 ng/l;

(x) Heptachlor: 0.08 ng/1;

(xi) Hexachlorobutadiene: 0.44 ug/l;

(xii) Polynuclear aromatic hydrocarbons (total of all PAHs): 2.8 ng/l;

(xiii) Tetrachloroethane (1,1,2,2): 0.17 ug/l;

(xiv) Tetrachloroethylene: 0.7 ug/l;

(xv) Trichloroethylene: 2.5 ug/l; ~~and~~

(xvi) Vinyl Chloride: 0.025 ~~ug/l.~~ ug/l; and

(xvii) 1,4-Dioxane: 0.35 ug/l.

(4) Wastewater and stormwater point source discharges in a WS-I watershed shall be permitted pursuant to 15A NCAC 02B .0104.

(5) Nonpoint source pollution in a WS-I watershed shall not have an adverse impact, as defined in 15A NCAC 02H .1002, on use as a water supply or any other designated use.

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; October 1, 1995; February 1, 1993; March 1, 1991; October 1, 1989;
Readopted Eff. ~~November 1, 2019.~~ November 1, 2019;
Amended Eff. Xx

15A NCAC 02B .0214 is proposed for amendment as follows:

15A NCAC 02B .0214 FRESH SURFACE WATER QUALITY STANDARDS FOR CLASS WS-II WATERS

The following water quality standards shall apply to surface waters within water supply watersheds classified as WS-II. Water quality standards applicable to Class C waters as described in Rule .0211of this Section shall also apply to Class WS-II waters.

(1) The best usage of waters classified as WS-II shall be as a source of water supply for drinking, culinary, or food-processing purposes for those users desiring maximum protection for their water supplies where a WS-I classification is not feasible as determined by the Commission in accordance with Rule .0212 of this Section and any best usage specified for Class C waters.

(2) The best usage of waters classified as WS-II shall be maintained as follows:

(a) Water quality standards in a WS-II watershed shall meet the requirements as specified in Item (3) of this Rule.

(b) Wastewater and stormwater point source discharges in a WS-II watershed shall meet the requirements as specified in Item (4) of this Rule.

(c) Nonpoint source pollution in a WS-II watershed shall meet the requirements as specified in Item (5) of this Rule.

(d) Following approved treatment, as defined in Rule .0202 of this Section, the waters shall meet the Maximum Contaminant Level concentrations considered safe for drinking, culinary, and food-processing purposes that are specified in 40 CFR Part 141 National Primary Drinking Water Regulations and in the North Carolina Rules Governing Public Water Supplies, 15A NCAC 18C .1500.

(e) Sources of water pollution that preclude any of the best uses on either a short-term or long-term basis shall be deemed to violate a water quality standard.

(f) The Class WS-II classification may be used to protect portions of Class WS-III and WS-IV water supplies. For reclassifications of these portions of Class WS-III and WS-IV water supplies occurring after the July 1, 1992 statewide reclassification, a WS-II classification that is requested by local governments shall be considered by the Commission if all local governments having jurisdiction in the affected areas have adopted a resolution and the appropriate ordinances as required by G.S. 143-214.5(d) to protect the watershed or if the Commission acts to protect a watershed when one or more local governments has failed to adopt protective measures as required by this Sub-Item.

(3) Water quality standards applicable to Class WS-II Waters shall be as follows:

(a) MBAS (Methylene-Blue Active Substances): not greater than 0.5 mg/l to protect the aesthetic qualities of water supplies and to prevent foaming;

(b) Odor producing substances contained in sewage or other wastes: only such amounts, whether alone or in combination with other substances or wastes, as shall not cause organoleptic effects in water supplies that cannot be corrected by treatment, impair the palatability of fish, or have an adverse impact, as defined in 15A NCAC 02H .1002, on any best usage established for waters of this class;

(c) Chlorinated phenolic compounds: not greater than 1.0 ug/l to protect water supplies from taste and odor problems from chlorinated phenols;

(d) Total hardness: not greater than 100 mg/l as calcium carbonate ($CaCO_3$ or Ca + Mg);

(e) Solids, total dissolved: not greater than 500 mg/l;

(f) Toxic and other deleterious substances that are non-carcinogens:

(i) Barium: 1.0 mg/l;

(ii) Chloride: 250 mg/l;

(iii) Nickel: 25 ug/l;

(iv) Nitrate nitrogen: 10.0 mg/l;

(v) 2,4-D: 70 ug/l;

(vi) 2,4,5-TP (Silvex): 10 ug/l; and

(vii) Sulfates: 250 mg/l;

(g) Toxic and other deleterious substances that are carcinogens:

(i) Aldrin: 0.05 ng/1;

(ii) Arsenic: 10 ug/l;

(iii) Benzene: 1.19 ug/1;

(iv) Carbon tetrachloride: 0.254 ug/l;

(v) Chlordane: 0.8 ng/1;

(vi) Chlorinated benzenes: 488 ug/l;

(vii) DDT: 0.2 ng/1;

(viii) Dieldrin: 0.05 ng/1;

(ix) Dioxin: 0.000005 ng/l;

(x) Heptachlor: 0.08 ng/1;

(xi) Hexachlorobutadiene: 0.44 ug/l;

(xii) Polynuclear aromatic hydrocarbons (total of all PAHs): 2.8 ng/l;

(xiii) Tetrachloroethane (1,1,2,2): 0.17 ug/l;

(xiv) Tetrachloroethylene: 0.7 ug/l;

(xv) Trichloroethylene: 2.5 ug/l; ~~and~~

(xvi) Vinyl Chloride: 0.025 ~~ug/l.~~ ug/l; and

(xvii) 1,4-Dioxane: 0.35 ug/l.

(4) Wastewater and stormwater point source discharges in a WS-II watershed shall meet the following requirements:

(a) Discharges that qualify for a General NPDES Permit pursuant to 15A NCAC 02H .0127 shall be allowed in the entire watershed.

(b) Discharges from trout farms that are subject to Individual NPDES Permits shall be allowed in the entire watershed.

(c) Stormwater discharges that qualify for an Individual NPDES Permit pursuant to 15A NCAC 02H .0126 shall be allowed in the entire watershed.

(d) No discharge of sewage, industrial, or other wastes shall be allowed in the entire watershed except for those allowed by Sub-Items (a) through (c) of this Item or Rule .0104 of this Subchapter, and none shall be allowed that have an adverse effect on human health or that are not treated in accordance with the permit or other requirements established by the Division pursuant to G.S. 143-215.1. Upon request by the Commission, a discharger shall disclose all chemical constituents present or potentially present in their wastes and chemicals that could be spilled or be present in runoff from their facility that may have an adverse impact on downstream water quality. These facilities may be required to have spill and treatment failure control plans as well as perform special monitoring for toxic substances.

(e) New domestic and industrial discharges of treated wastewater that are subject to Individual NPDES Permits shall not be allowed in the entire watershed.

(f) No new landfills shall be allowed in the Critical Area, and no NPDES permits shall be issued for landfills that discharge treated leachate in the remainder of the watershed.

(g) No new permitted sites for land application of residuals or petroleum contaminated soils shall be allowed in the Critical Area.

(5) Nonpoint source pollution in a WS-II watershed shall meet the following requirements:

(a) Nonpoint source pollution shall not have an adverse impact on waters for use as a water supply or any other designated use.

(b) Class WS-II waters shall be protected as water supplies that are located in watersheds that meet average watershed development density levels specified for Class WS-II waters in Rule .0624 of this Subchapter.

History Note: *Authority G.S. 143-214.1; 143-215.3(a)(1);*
Eff. May 10, 1979;
Amended Eff. January 1, 2015; May 1, 2007; April 1, 2003; January 1, 1996; October 1, 1995;
Readopted Eff. November 1, ~~2019.~~ November 1, 2019;
Amended Eff. Xx.

15A NCAC 02B .0215 is proposed for amendment as follows:

15A NCAC 02B .0215 FRESH SURFACE WATER QUALITY STANDARDS FOR CLASS WS-III WATERS

The following water quality standards shall apply to surface waters within water supply watersheds classified as WS-III. Water quality standards applicable to Class C waters as described in Rule .0211 of this Section shall also apply to Class WS-III waters.

(1) The best usage of waters classified as WS-III shall be as a source of water supply for drinking, culinary, or food-processing purposes for those users where a more protective WS-I or WS-II classification is not feasible as determined by the Commission in accordance with Rules .0212 and .0214 of this Section and any other best usage specified for Class C waters.

(2) The best usage of waters classified as WS-III shall be maintained as follows:

(a) Water quality standards in a WS-III watershed shall meet the requirements as specified in Item (3) of this Rule.

(b) Wastewater and stormwater point source discharges in a WS-III watershed shall meet the requirements as specified in Item (4) of this Rule.

(c) Nonpoint source pollution in a WS-III watershed shall meet the requirements as specified in Item (5) of this Rule.

(d) Following approved treatment, as defined in Rule .0202 of this Section, the waters shall meet the Maximum Contaminant Level concentrations considered safe for drinking, culinary, or food-processing purposes that are specified in 40 CFR Part 141 National Primary Drinking Water Regulations and in the North Carolina Rules Governing Public Water Supplies, 15A NCAC 18C .1500.

(e) Sources of water pollution that preclude any of the best uses on either a short-term or long-term basis shall be deemed to violate a water quality standard.

(f) The Class WS-III classification may be used to protect portions of Class WS-IV water supplies. For reclassifications of these portions of WS-IV water supplies occurring after the July 1, 1992 statewide reclassification, a ~~WS~~[VJ1] ~~II classification~~ more protective classification, such as WS-III, that is requested by local governments shall be considered by the Commission if all local governments having jurisdiction in the affected areas have adopted a resolution and the appropriate ordinances as required by G.S. 143-214.5(d) to protect the watershed or if the Commission acts to protect a watershed when one or more local governments has failed to adopt protective measures as required by this Sub-Item.

(3) Water quality standards applicable to Class WS-III Waters shall be as follows:

(a) MBAS (Methylene-Blue Active Substances): not greater than 0.5 mg/l to protect the aesthetic qualities of water supplies and to prevent foaming;

(b) Odor producing substances contained in sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances or wastes, as shall not cause organoleptic effects in water supplies that cannot be corrected by treatment, impair the palatability of fish, or have an adverse impact, as defined in 15A NCAC 02H .1002, on any best usage established for waters of this class;

(c) Chlorinated phenolic compounds: not greater than 1.0 ug/l to protect water supplies from taste and odor problems from chlorinated phenols;

(d) Total hardness: not greater than 100 mg/l as calcium carbonate ($CaCO_3$ or Ca + Mg);

(e) Solids, total dissolved: not greater than 500 mg/l;

(f) Toxic and other deleterious substances that are non-carcinogens:

(i) Barium: 1.0 mg/l;

(ii) Chloride: 250 mg/l;

(iii) Nickel: 25 ug/l;

(iv) Nitrate nitrogen: 10.0 mg/l;

(v) 2,4-D: 70 ug/l;

(vi) 2,4,5-TP (Silvex): 10 ug/l; and

(vii) Sulfates: 250 mg/l;

(g) Toxic and other deleterious substances that are carcinogens:

(i) Aldrin: 0.05 ng/1;

(ii) Arsenic: 10 ug/l;

(iii) Benzene: 1.19 ug/1;

(iv) Carbon tetrachloride: 0.254 ug/l;

(v) Chlordane: 0.8 ng/1;

(vi) Chlorinated benzenes: 488 ug/l;

(vii) DDT: 0.2 ng/1;

(viii) Dieldrin: 0.05 ng/1;

(ix) Dioxin: 0.000005 ng/l;

(x) Heptachlor: 0.08 ng/1;

(xi) Hexachlorobutadiene: 0.44 ug/l;

(xii) Polynuclear aromatic hydrocarbons (total of all PAHs): 2.8 ng/l;

(xiii) Tetrachloroethane (1,1,2,2): 0.17 ug/l;

(xiv) Tetrachloroethylene: 0.7 ug/l;

(xv) Trichloroethylene: 2.5 ug/l; ~~and~~

(xvi) Vinyl Chloride: 0.025 ~~ug/l.~~ ug/l; and

(xvii) 1,4-Dioxane; 0.35 ug/l.

(4) Wastewater and stormwater point source discharges in a WS-III watershed shall meet the following requirements:

(a) Discharges that qualify for a General NPDES Permit pursuant to 15A NCAC 02H .0127 shall be allowed in the entire watershed.

(b) Discharges from trout farms that are subject to Individual NPDES Permits shall be allowed in the entire watershed.

(c) Stormwater discharges that qualify for an Individual NPDES Permit pursuant to 15A NCAC 02H .0126 shall be allowed in the entire watershed.

(d) New domestic wastewater discharges that are subject to Individual NPDES Permits shall not be allowed in the Critical Area and are allowed in the remainder of the watershed.

(e) New industrial wastewater discharges that are subject to Individual NPDES Permits except non-process industrial discharges shall not be allowed in the entire watershed.

(f) No discharge of sewage, industrial, or other wastes shall be allowed in the entire watershed except for those allowed by Sub-Items (a) through (e) of this Item or Rule .0104 of this Subchapter, and none shall be allowed that have an adverse effect on human health or that are not treated in accordance with the permit or other requirements established by the Division pursuant to G.S. 143-215.1. Upon request by the Commission, a discharger shall disclose all chemical constituents present or potentially present in their wastes and chemicals that could be spilled or be present in runoff from their facility that may have an adverse impact on downstream water quality. These facilities may be required to have spill and treatment failure control plans as well as perform special monitoring for toxic substances.

(g) No new landfills shall be allowed in the Critical Area, and no NPDES permits shall be issued for landfills to discharge treated leachate in the remainder of the watershed.

(h) No new permitted sites for land application of residuals or petroleum contaminated soils shall be allowed in the Critical Area.

(5) Nonpoint source pollution in a WS-III watershed shall meet the following requirements:

(a) Nonpoint source pollution shall not have an adverse impact on waters for use as a water supply or any other designated use.

(b) Class WS-III waters shall be protected as water supplies that are located in watersheds that meet average watershed development density levels specified Class WS-III waters in Rule .0624 of this Subchapter.

History Note: *Authority G.S. 143-214.1; 143-215.3(a)(1);*
Eff. September 9, 1979;
Amended Eff. January 1, 2015; May 1, 2007; April 1, 2003; January 1, 1996; October 1, 1995; October 1, 1989;
Readopted Eff. ~~November 1, 2019.~~ November 1, 2019;
Amended Eff. Xxxxx.

15A NCAC 02B .0216 is proposed for amendment as follows:

15A NCAC 02B .0216 FRESH SURFACE WATER QUALITY STANDARDS FOR CLASS WS-IV WATERS

The following water quality standards shall apply to surface waters within water supply watersheds classified as WS-IV. Water quality standards applicable to Class C waters as described in Rule .0211 of this Section shall also apply to Class WS-IV waters.

(1) The best usage of waters classified as WS-IV shall be as a source of water supply for drinking, culinary, or food-processing purposes for those users where a more protective WS-I, WS-II or WS-III classification is not feasible as determined by the Commission in accordance with Rules .0212 through .0215 of this Section and any other best usage specified for Class C waters.

(2) The best usage of waters classified as WS-IV shall be maintained as follows:

(a) Water quality standards in a WS-IV watershed shall meet the requirements as specified in Item (3) of this Rule.

(b) Wastewater and stormwater point source discharges in a WS-IV watershed shall meet the requirements as specified in Item (4) of this Rule.

(c) Nonpoint source pollution in a WS-IV watershed shall meet the requirements as specified in Item (5) of this Rule.

(d) Following approved treatment, as defined in Rule .0202 of this Section, the waters shall meet the Maximum Contaminant Level concentrations considered safe for drinking, culinary, or food-processing purposes that are specified in 40 CFR Part 141 National Primary Drinking Water Regulations and in the North Carolina Rules Governing Public Water Supplies, 15A NCAC 18C .1500.

(e) Sources of water pollution that preclude any of the best uses on either a short-term or long-term basis shall be deemed to violate a water quality standard.

(f) The Class WS-II or WS-III classifications may be used to protect portions of Class WS-IV water supplies. For reclassifications of these portions of WS-IV water supplies occurring after the July 1, 1992 statewide reclassification, a ~~WS~~[VJ1] ~~-IV classification~~ more protective classification, such as a WS-II or WS-III, that is requested by local governments shall be considered by the Commission if all local governments having jurisdiction in the affected areas have adopted a resolution and the appropriate ordinances as required by G.S. 143-214.5(d) to protect the watershed or if the Commission acts to protect a watershed when one or more local governments has failed to adopt protective measures as required by this Sub-Item.

(3) Water quality standards applicable to Class WS-IV Waters shall be as follows:

(a) MBAS (Methylene-Blue Active Substances): not greater than 0.5 mg/l to protect the aesthetic qualities of water supplies and to prevent foaming;

(b) Odor producing substances contained in sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances or waste, as will not cause organoleptic effects in water supplies that cannot be corrected by treatment, impair the palatability of fish, or have an adverse impact, as defined in 15A NCAC 02H .1002, on any best usage established for waters of this class;

(c) Chlorinated phenolic compounds: not greater than 1.0 ug/l to protect water supplies from taste and odor problems due to chlorinated phenols shall be allowed. Specific phenolic compounds may be given a different limit if it is demonstrated not to cause taste and odor problems and not to be detrimental to other best usage;

(d) Total hardness: not greater than 100 mg/l as calcium carbonate ($CaCO_3$ or Ca + Mg);

(e) Solids, total dissolved: not greater than 500 mg/l;

(f) Toxic and other deleterious substances that are non-carcinogens:

(i) Barium: 1.0 mg/l;

(ii) Chloride: 250 mg/l;

(iii) Nickel: 25 ug/l;

(iv) Nitrate nitrogen: 10.0 mg/l;

(v) 2,4-D: 70 ug/l;

(vi) 2,4,5-TP (Silvex): 10 ug/l; and

(vii) Sulfates: 250 mg/l;

(g) Toxic and other deleterious substances that are carcinogens:

(i) Aldrin: 0.05 ng/1;

(ii) Arsenic: 10 ug/l;

(iii) Benzene: 1.19 ug/1;

(iv) Carbon tetrachloride: 0.254 ug/l;

(v) Chlordane: 0.8 ng/1;

(vi) Chlorinated benzenes: 488 ug/l;

(vii) DDT: 0.2 ng/1;

(viii) Dieldrin: 0.05 ng/1;

(ix) Dioxin: 0.000005 ng/l;

(x) Heptachlor: 0.08 ng/1;

(xi) Hexachlorobutadiene: 0.44 ug/l;

(xii) Polynuclear aromatic hydrocarbons (total of all PAHs): 2.8 ng/l;

(xiii) Tetrachloroethane (1,1,2,2): 0.17 ug/l;

(xiv) Tetrachloroethylene: 0.7 ug/l;

(xv) Trichloroethylene: 2.5 ug/l; ~~and~~

(xvi) Vinyl Chloride: 0.025 ~~ug/l.~~ ug/l; and

(xvii) 1,4-Dioxane: 0.35 ug/l.

(4) Wastewater and stormwater point source discharges in a WS-IV watershed shall meet the following requirements:

(a) Discharges that qualify for a General NPDES Permit pursuant to 15A NCAC 02H .0127 shall be allowed in the entire watershed.

(b) Discharges from domestic facilities, industrial facilities and trout farms that are subject to Individual NPDES Permits shall be allowed in the entire watershed.

(c) Stormwater discharges that qualify for an Individual NPDES Permit pursuant to 15A NCAC 02H .0126 shall be allowed in the entire watershed.

(d) No discharge of sewage, industrial wastes, or other wastes shall be allowed in the entire watershed except for those allowed by Sub-Items (a) through (c) of this Item or Rule .0104 of this Subchapter, and none shall be allowed that have an adverse effect on human health or that are not treated in accordance with the permit or other requirements established by the Division pursuant to G.S. 143-215.1. Upon request by the Commission, dischargers or industrial users subject to pretreatment standards shall disclose all chemical constituents present or potentially present in their wastes and chemicals that could be spilled or be present in runoff from their facility which may have an adverse impact on downstream water supplies. These facilities may be required to have spill and treatment failure control plans as well as perform special monitoring for toxic substances.

(e) New industrial discharges of treated wastewater in the critical area shall meet the provisions of Rule .0224(c)(2)(D), (E), and (G) of this Section and Rule .0203 of this Section.

(f) New industrial connections and expansions to existing municipal discharges with a pretreatment program pursuant to 15A NCAC 02H .0904 shall be allowed in the entire watershed.

(g) No new landfills shall be allowed in the Critical Area.

(h) No new permitted sites for land application residuals or petroleum contaminated soils shall be allowed in the Critical Area.

(5) Nonpoint source pollution in a WS-IV watershed shall meet the following requirements:

(a) Nonpoint source pollution shall not have an adverse impact on waters for use as a water supply or any other designated use.

(b) Class WS-IV waters shall be protected as water supplies that are located in watersheds that meet average watershed development density levels specified for Class WS-IV waters in Rule .0624 of this Subchapter.

History Note: *Authority G.S. 143-214.1; 143-215.3(a)(1);*
Eff. February 1, 1986;

Amended Eff. January 1, 2015; May 1, 2007; April 1, 2003; June 1, 1996; October 1, 1995; August 1, 1995; June 1, 1994;

Readopted Eff. ~~November 1, 2019.~~ November 1, 2019;

Amended Eff. Xxxxxx.

15A NCAC 02B .0218 is proposed for amendment as follows:

15A NCAC 02B .0218 FRESH SURFACE WATER QUALITY STANDARDS FOR CLASS WS-V WATERS

The following water quality standards shall apply to surface waters within water supply watersheds classified as WS-V. Water quality standards applicable to Class C waters as described in Rule .0211 of this Section shall also apply to Class WS-V waters.

(1) The best usage of waters classified as WS-V shall be as waters that are protected as water supplies which are generally upstream and draining to Class WS-IV waters; waters previously used for drinking water supply purposes; or waters used by industry to supply their employees, but not municipalities or counties, with a raw drinking water supply source, although this type of use is not restricted to WS-V classification; and all Class C uses.

(2) The best usage of waters classified as WS-V shall be maintained as follows:

(a) Water quality standards in a WS-V water shall meet the requirements as specified in Item (3) of this Rule.

(b) Wastewater and stormwater point source discharges in a WS-V water shall meet the requirements as specified in Item (4) of this Rule.

(c) Nonpoint source pollution in a WS-V water shall meet the requirements as specified in Item (5) of this Rule.

(d) Following approved treatment, as defined in Rule .0202 of this Section, the waters shall meet the Maximum Contaminant Level concentrations considered safe for drinking, culinary, or food-processing purposes that are specified in 40 CFR Part 141 National Primary Drinking Water Regulations and in the North Carolina Rules Governing Public Water Supplies, 15A NCAC 18C .1500.

(e) The Commission or its designee may apply management requirements for the protection of waters downstream of receiving waters provided in Rule .0203 of this Section.

(f) The Commission shall consider a more protective classification for the water supply if a resolution requesting a more protective classification is submitted from all local governments having land use jurisdiction within the affected watershed.

(g) Sources of water pollution that preclude any of the best uses on either a short-term or long-term basis shall be deemed to violate a water quality standard;

(3) Water quality standards applicable to Class WS-V Waters shall be as follows:

(a) MBAS (Methylene-Blue Active Substances): not greater than 0.5 mg/l to protect the aesthetic qualities of water supplies and to prevent foaming;

(b) Odor producing substances contained in sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with other substances or waste, as will not cause organoleptic effects in water supplies that can not be corrected by treatment, impair

the palatability of fish, or have an adverse impact, as defined in 15A NCAC 02H .1002, on any best usage established for waters of this class;

(c) Chlorinated phenolic compounds: not greater than 1.0 ug/l to protect water supplies from taste and odor problems due to chlorinated phenols. Specific phenolic compounds may be given a different limit if it is demonstrated not to cause taste and odor problems and not to be detrimental to other best usage;

(d) Total hardness: not greater than 100 mg/l as calcium carbonate ($CaCO_3$ or Ca + Mg);

(e) Solids, total dissolved: not greater than 500 mg/l;

(f) Toxic and other deleterious substances that are non-carcinogens:

(i) Barium: 1.0 mg/l;

(ii) Chloride: 250 mg/l;

(iii) Nickel: 25 ug/l;

(iv) Nitrate nitrogen: 10.0 mg/l;

(v) 2,4-D: 70 ug/l;

(vi) 2,4,5-TP (Silvex): 10 ug/l; and

(vii) Sulfates: 250 mg/l;

(g) Toxic and other deleterious substances that are carcinogens:

(i) Aldrin: 0.05 ng/1;

(ii) Arsenic: 10 ug/l;

(iii) Benzene: 1.19 ug/1;

(iv) Carbon tetrachloride: 0.254 ug/l;

(v) Chlordane: 0.8 ng/1;

(vi) Chlorinated benzenes: 488 ug/l;

(vii) DDT: 0.2 ng/1;

(viii) Dieldrin: 0.05 ng/1;

(ix) Dioxin: 0.000005 ng/l;

(x) Heptachlor: 0.08 ng/1;

(xi) Hexachlorobutadiene: 0.44 ug/l;

(xii) Polynuclear aromatic hydrocarbons (total of all PAHs): 2.8 ng/l;

(xiii) Tetrachloroethane (1,1,2,2): 0.17 ug/l;

(xiv) Tetrachloroethylene: 0.7 ug/l;

(xv) Trichloroethylene: 2.5 ug/l; ~~and~~

(xvi) Vinyl Chloride: 0.025 ~~ug/l.~~ ug/l; and

(xvii) 1,4-Dioxane: 0.35 ug/l.

(4) No discharge of sewage, industrial wastes, or other wastes shall be allowed that have an adverse effect on human health or that are not treated in accordance with the permit or other requirements established by the Division pursuant to G.S. 143-215.1. Upon request by the Commission,

dischargers or industrial users subject to pretreatment standards shall disclose all chemical constituents present or potentially present in their wastes and chemicals that could be spilled or be present in runoff from their facility which may have an adverse impact on downstream water quality. These facilities may be required to have spill and treatment failure control plans as well as perform special monitoring for toxic substances.

(5) Nonpoint Source pollution in a WS-V water shall not have an adverse impact on waters for use as water supply or any other designated use.

History Note: *Authority G.S. 143-214.1; 143-215.3(a)(1);*
Eff. October 1, 1989;
Amended Eff. January 1, 2015; May 1, 2007; April 1, 2003; October 1, 1995;
Readopted Eff. ~~November 1, 2019.~~ November 1, 2019;
Amended Eff. Xxx.

15A NCAC 02B .0219 is proposed for amendment as follows:

15A NCAC 02B .0219 FRESH SURFACE WATER QUALITY STANDARDS FOR CLASS B WATERS

The following water quality standards shall apply to surface waters that are for primary contact recreation as defined in Rule .0202 of this Section, and are classified as Class B waters. Water quality standards applicable to Class C waters as described in Rule .0211 of this Section also apply to Class B waters.

(1) The best usage of Class B waters shall be primary contact recreation and any other best usage specified for Class C waters.

(2) Class B waters shall meet the standards of water quality for outdoor bathing places as specified in Item (3) of this Rule and shall be of sufficient size and depth for primary contact recreation. In assigning the B classification to waters intended for primary contact recreation, the Commission shall consider the relative proximity of sources of water pollution and the potential hazards involved in locating swimming areas close to sources of water pollution and shall not assign this classification to waters in which such water pollution could result in a hazard to public health. Sources of water pollution that preclude any of these uses on either a short-term or long-term basis shall be deemed to violate a water quality standard.

(3) Quality standards applicable to Class B waters:

(a) Sewage, industrial wastes, or other wastes: none shall be allowed that are not treated to the satisfaction of the Commission. In determining the degree of treatment required for such waste when discharged into waters to be used for bathing, the Commission shall consider the quality and quantity of the sewage and wastes involved and the proximity of such discharges to waters in this class. Discharges in the immediate vicinity of bathing areas shall not be allowed if the Director determines that the waste cannot be treated to ensure the protection of primary contact recreation;

(b) Fecal coliforms shall not exceed a geometric mean of 200/100 ml (MF count) based on at least five samples taken over a 30 day period, nor exceed 400/100 ml in more than 20 percent of the samples examined during such ~~period.~~ period;

(c) For the counties listed in this Sub-Item, Escherichia coli (E. coli) shall be used as the bacterial indicator in lieu of Sub-Item (b) of this Item. E. coli shall not exceed a geometric mean of 100 colony forming units (cfu) per 100 ml (MF count) or a most probable number value (MPN) of 100 per 100 ml based upon a minimum of five samples taken over a 30 day period, and E. coli shall not exceed 320 cfu/100 ml or 320 MPN/100 ml in more than 20 percent of the samples examined during the same 30-day period. The counties subject to this site-specific standard are:

(i) Avery;

(ii) Buncombe;

(iii) Burke;

(iv) Caldwell;
(v) Cherokee;
(vi) Clay;
(vii) Graham;
(viii) Haywood;
(ix) Henderson;
(x) Jackson;
(xi) Macon;
(xii) Madison;
(xiii) McDowell;
(xiv) Mitchell;
(xv) Polk;
(xvi) Rutherford;
(xvii) Swain;
(xviii) Transylvania; and
(xix) Yancey.

(4) Wastewater discharges to waters classified as B shall meet the reliability requirements specified in 15A NCAC 02H .0124. Discharges to waters where a primary contact recreational use is determined by the Director to be attainable shall be required to meet water quality standards and reliability requirements to protect this use concurrently with reclassification efforts.

History Note: *Authority G.S. 143-214.1; 143-215.3(a)(1);*
Eff. January 1, 1990;
Amended Eff. October 1, 1995;
Readopted Eff. ~~November 1, 2019.~~ November 1, 2019;
Amended Eff. Xx.

15A NCAC 02B .0220 is proposed for amendment as follows:

15A NCAC 02B .0220 TIDAL SALT WATER QUALITY STANDARDS FOR CLASS SC WATERS

In addition to the standards set forth in Rule .0208 of this Section, the following water quality standards shall apply to all Class SC waters. Additional standards applicable to other tidal salt water classifications are specified in Rules .0221 and .0222 of this Section.

(1) The best usage of waters classified as SC shall be aquatic life propagation, survival, and maintenance of biological integrity (including fishing, fish, and Primary Nursery Areas (PNAs)); wildlife; secondary contact recreation as defined in Rule .0202 in this Section; and any usage except primary contact recreation or shellfishing for market purposes. All saltwaters shall be classified to protect these uses at a minimum.

(2) The best usage of waters classified as SC shall be maintained as specified in this Rule. Any source of water pollution that precludes any of these uses on either a short-term or a long-term basis shall be deemed to violate a water quality standard;

(3) Chlorophyll a (corrected): not greater than 40 ug/l in sounds, estuaries, and other waters subject to growths of macroscopic or microscopic vegetation. The Commission or its designee may prohibit or limit any discharge of waste into surface waters if the Director determines that 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;

(4) Cyanide: 1 ug/l;

(5) Dissolved oxygen: not less than 5.0 mg/l, except that swamp waters, poorly flushed tidally influenced streams or embayments, or estuarine bottom waters may have lower values if caused by natural conditions;

(6) Enterococcus, including Enterococcus faecalis, Enterococcus faecium, Enterococcus avium and Enterococcus gallinarium: not exceed a geometric mean of 35 enterococci per 100 ml based upon a minimum of five samples taken over a 30-day period. For the purposes of beach monitoring and notification, "Coastal Recreational Waters Monitoring, Evaluation and Notification" regulations (15A NCAC 18A .3400), available free of charge at: http://www.ncoah.com/, are incorporated by reference including subsequent amendments and editions;

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

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

(9) Metals:

(a) With the exception of mercury and selenium, acute and chronic tidal salt water quality standards for metals shall be based upon measurement of the dissolved fraction of the

metals. Mercury and selenium shall be based upon measurement of the total recoverable metal;

(b) With the exception of mercury and selenium, acute and chronic tidal saltwater quality 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 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). 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."

(c) Acute and chronic tidal salt water quality metals standards shall be as follows:

(i) Arsenic, acute: WER· 69 ug/l;

(ii) Arsenic, chronic: WER· 36 ug/l;

(iii) Cadmium, acute: WER· ~~40~~ 33 ug/l;

(iv) Cadmium, chronic: WER· ~~8.8~~ 7.9 ug/l;

(v) Chromium VI, acute: WER· 1100 ug/l;

(vi) Chromium VI, chronic: WER· 50 ug/l;

(vii) Copper, acute: WER· 4.8 ug/l;

(viii) Copper, chronic: WER· 3.1 ug/l;

(ix) Lead, acute: WER· 210 ug/l;

(x) Lead, chronic: WER· 8.1 ug/l;

(xi) Mercury, total recoverable, chronic: 0.025 ug/l;

(xii) Nickel, acute: WER· 74 ug/l;

(xiii) Nickel, chronic: WER· 8.2 ug/l;

(xiv) Selenium, total recoverable, chronic: 71 ug/l;

(xv) Silver, acute: WER· 1.9 ug/l;

(xvi) Silver, chronic: WER· 0.1 ug/l;

(xvii) Zinc, acute: WER· 90 ug/l; and

(xviii) Zinc, chronic: WER· 81 ug/l;

(d) 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 averages of a minimum of four samples taken on consecutive days, or as a 96-hour average;

(10) Oils, deleterious substances, or colored or other wastes: only such amounts as shall not render the waters injurious to public health, secondary recreation, 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, incorporated by reference including any subsequent amendments and editions. This material is available free of charge at https://www.govinfo.gov.

(11) Pesticides:

(a) Aldrin: 0.003 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: 0.009 ug/l;

(g) Endrin: 0.002 ug/l;

(h) Guthion: 0.01 ug/l;

(i) Heptachlor: 0.004 ug/l;

(j) Lindane: 0.004 ug/l;

(k) Methoxychlor: 0.03 ug/l;

(l) Mirex: 0.001 ug/l;

(m) Parathion: 0.178 ug/l; and

(n) Toxaphene: 0.0002 ug/l;

(12) pH: shall be between 6.8 and 8.5, except that swamp waters may have a pH as low as 4.3 if it is the result of natural conditions;

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

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

(15) 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;

(16) Salinity: changes in salinity due to hydrological modifications shall not result in removal of the functions of a PNA. Projects that are determined by the Director to result in modifications of salinity

such that functions of a PNA are impaired shall employ water management practices to mitigate salinity impacts;

(17) Temperature: shall not be increased above the natural water temperature by more than 0.8 degrees C (1.44 degrees F) during the months of June, July, and August, shall not be increased by more than 2.2 degrees C (3.96 degrees F) during other months, and shall in no case exceed 32 degrees C (89.6 degrees F) due to the discharge of heated liquids;

(18) Trialkyltin compounds: 0.007 ug/l expressed as tributyltin;

(19) Turbidity: the turbidity in the receiving water shall not exceed 25 Nephelometric Turbidity Units (NTU); if turbidity exceeds this level 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), defined by Rule .0202 of this Section, recommended by the Designated Nonpoint Source Agency, as defined by Rule .0202 of this Section.

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

15A NCAC 02B .0301 is proposed for amendment as follows:

SECTION .0300 - ASSIGNMENT OF STREAM CLASSIFICATIONS

15A NCAC 02B .0301 CLASSIFICATIONS: GENERAL

(a) The classifications assigned to the waters of the State of North Carolina are set forth in river basin classification schedules provided at https://deq.nc.gov/about/divisions/water-resources/water-planning/classification-standards/river-basin-classification and in Rules .0302 to .0317 of this Section. These classifications are based upon procedures described in Rule .0101 of this Subchapter.

(b) Classifications. The classifications assigned to the waters of North Carolina are denoted by the letters C, B, WS-I, WS-II, WS-III, WS-IV, WS-V, WL, SC, SB, SA, SWL, Tr, Sw, NSW, ORW, HQW, and UWL. The "best usage", as defined in Rule .0202 of this Subchapter, for each classification is defined in the rules as follows:

(1) Fresh Waters Classifications:
  (A) Class C: Rule .0211 of this Subchapter;
  (B) Class B: Rule .0219 of this Subchapter;
  (C) Class WS-I (Water Supply): Rule .0212 of this Subchapter;
  (D) Class WS-II (Water Supply): Rule .0214 of this Subchapter;
  (E) Class WS-III (Water Supply): Rule .0215 of this Subchapter;
  (F) Class WS-IV (Water Supply): Rule .0216 of this Subchapter;
  (G) Class WS-V (Water Supply): Rule .0218 of this Subchapter; and
  (H) Class WL (Wetlands): Rule .0231 of this Subchapter.

(2) Tidal Salt Waters Classifications:
  (A) Class SC: Rule .0220 of this Subchapter;
  (B) Class SB: Rule .0222 of this Subchapter;
  (C) Class SA: Rule .0221 of this Subchapter; and
  (D) Class SWL: Rule .0231 of this Subchapter.

(3) Supplemental Classifications:
  (A) Class Tr (Trout Waters): Rule .0202 of this Subchapter;
  (B) Class Sw (Swamp): Rule .0202 of this Subchapter;
  (C) Class NSW (Nutrient Sensitive Waters): Rule .0223 of this Subchapter;
  (D) Class ORW (Outstanding Resource Waters): Rule .0225 of this Subchapter;
  (E) Class HQW (High Quality Waters): Rule .0224 of this Subchapter; and
  (F) Class UWL (Unique Wetlands): Rule .0231 of this Subchapter.

(c) Water Quality Standards. The water quality standards applicable to each classification assigned are those established in the rules of Section .0200 of this Subchapter.

(d) Index Number. The index number is an identification number assigned to each stream or segment of a stream, indicating the specific tributary progression between the main stem stream and tributary stream. The index number can be referenced to the Division's river basin classification schedules (hydrologic and alphabetic) for each river basin.

(e) Classification Date. The classification date indicates the date on which enforcement of the provisions of General Statutes 143-215.1 became effective with reference to the classification assigned to the various streams in North Carolina.

(f) Unnamed Streams.

(1) Any stream that is not listed in a river basin classification schedule carries the same classification as that assigned to the stream segment to which it is tributary except:

(A) unnamed freshwaters tributary to tidal saltwaters will be classified "C"; or

(B) after November 1, 1986, any areas of tidal saltwater created by dredging projects approved in accordance with 15A NCAC 07H .0208 and connected to Class SA waters shall be classified "SC" unless case-by-case reclassification proceedings are conducted per Rule .0101 of this Subchapter.

(2) In addition to Subparagraph ~~(f)(1)~~ (1) of this ~~Rule,~~ Paragraph, for unnamed streams entering other ~~states,~~ states, tribes approved for treatment as a state and administering a U.S. Environmental Protection Agency approved water quality standards program, or for specific areas of a river basin, the following Rules shall apply:

(A) Hiwassee River Basin (Rule .0302 of this Section);

(B) Little Tennessee River Basin and Savannah River Drainage Area (Rule .0303 of this Section);

(C) French Broad River Basin (Rule .0304 of this Section);

(D) Watauga River Basin (Rule .0305 of this Section);

(E) Broad River Basin (Rule .0306 of this Section);

(F) New River Basin (Rule .0307 of this Section);

(G) Catawba River Basin (Rule .0308 of this Section);

(H) Yadkin-Pee Dee River Basin (Rule .0309 of this Section);

(I) Lumber River Basin (Rule .0310 of this Section);

(J) Roanoke River Basin (Rule .0313 of this Section);

(K) Tar-Pamlico River Basin (Rule .0316 of this Section); and

(L) Pasquotank River Basin (Rule .0317 of this Section).

History Note: *Authority G.S. 143-214.1; 143-214.5; 143-215.1; 143-215.3(a)(1);*
Eff. February 1, 1976;
Amended Eff. August 1, 1995; August 3, 1992; August 1, 1990; October 1, 1989;
Readopted Eff. ~~*November 1, 2019.*~~ *November 1, 2019;*
Amended Eff. xxxxx

15A NCAC 02B .0311 proposed for amendment as follows:

15A NCAC 02B .0311 CAPE FEAR RIVER BASIN

(a) Classifications assigned to the waters within the Cape Fear River Basin are set forth in the Cape Fear River Basin Classification Schedule, which may be inspected at the following places:

(1) the Internet at https://deq.nc.gov/about/divisions/water-resources/water-planning/classification-standards/river-basin-classification; and

(2) the following offices of the North Carolina Department of Environmental Quality:

(A) Winston-Salem Regional Office
450 West Hanes Mill Road
Winston-Salem, North Carolina;

(B) Fayetteville Regional Office
225 Green Street
Systel Building Suite 714
Fayetteville, North Carolina;

(C) Raleigh Regional Office
3800 Barrett Drive
Raleigh, North Carolina;

(D) Washington Regional Office
943 Washington Square Mall
Washington, North Carolina;

(E) Wilmington Regional Office
127 Cardinal Drive Extension
Wilmington, North Carolina; and

(F) Division of Water Resources
Central Office
512 North Salisbury Street
Raleigh, North Carolina.

(b) The Cape Fear River Basin Classification Schedule was amended effective:

(1) March 1, 1977;

(2) December 13, 1979;

(3) December 14, 1980;

(4) August 9, 1981;

(5) April 1, 1982;

(6) December 1, 1983;

(7) January 1, 1985;

(8) August 1, 1985;

(9) December 1, 1985;

(10) February 1, 1986;

(11) July 1, 1987;

(12) October 1, 1987;

(13) March 1, 1988;

(14) August 1, 1990.

(c) The Cape Fear River Basin Classification Schedule was amended effective June 1, 1988 as follows:

(1) Cane Creek [Index No. 16-21-(1)] from source to a point 0.5 mile north of N.C. Hwy. 54 (Cane Reservoir Dam) including the Cane Creek Reservoir and all tributaries has been reclassified from Class WS-III to WS-I.

(2) Morgan Creek [Index No. 16-41-1-(1)] to the University Lake dam including University Lake and all tributaries has been reclassified from Class WS-III to WS-I.

(d) The Cape Fear River Basin Classification Schedule was amended effective July 1, 1988 by the reclassification of Crane Creek (Crains Creek) [Index No. 18-23-16-(1)] from source to mouth of Beaver Creek including all tributaries from C to WS-III.

(e) The Cape Fear River Basin Classification Schedule was amended effective January 1, 1990 as follows:

(1) Intracoastal Waterway (Index No. 18-87) from southern edge of White Oak River Basin to western end of Permuda Island (a line from Morris Landing to Atlantic Ocean), from the eastern mouth of Old Topsail Creek to the southwestern shore of Howe Creek and from the southwest mouth of Shinn Creek to channel marker No. 153 including all tributaries except the King Creek Restricted Area, Hardison Creek, Old Topsail Creek, Mill Creek, Futch Creek and Pages Creek were reclassified from Class SA to Class SA ORW.

(2) Topsail Sound and Middle Sound ORW Area which includes all waters between the Barrier Islands and the Intracoastal Waterway located between a line running from the western most shore of Mason Inlet to the southwestern shore of Howe Creek and a line running from the western shore of New Topsail Inlet to the eastern mouth of Old Topsail Creek was reclassified from Class SA to Class SA ORW.

(3) Masonboro Sound ORW Area which includes all waters between the Barrier Islands and the mainland from a line running from the southwest mouth of Shinn Creek at the Intracoastal Waterway to the southern shore of Masonboro Inlet and a line running from the Intracoastal Waterway Channel marker No. 153 to the southside of the Carolina Beach Inlet was reclassified from Class SA to Class SA ORW.

(f) The Cape Fear River Basin Classification Schedule was amended effective January 1, 1990 as follows: Big Alamance Creek [Index No. 16-19-(1)] from source to Lake Mackintosh Dam including all tributaries has been reclassified from Class WS-III NSW to Class WS-II NSW.

(g) The Cape Fear River Basin Classification Schedule was amended effective August 3, 1992 with the reclassification of all water supply waters (waters with a primary classification of WS-I, WS-II or WS-III). These waters were reclassified to WS-I, WS-II, WS-III, WS-IV or WS-V as defined in the revised water supply protection

rules (15A NCAC 02B .0100, .0200 and .0300), which became effective on August 3, 1992. In some cases, streams with primary classifications other than WS were reclassified to a WS classification due to their proximity and linkage to water supply waters. In other cases, waters were reclassified from a WS classification to an alternate appropriate primary classification after being identified as downstream of a water supply intake or identified as not being used for water supply purposes.

(h) The Cape Fear River Basin Classification Schedule was amended effective June 1, 1994 as follows:

(1) The Black River from its source to the Cape Fear River [Index Nos. 18-68-(0.5), 18-68-(3.5) and 18-65-(11.5)] was reclassified from Classes C Sw and C Sw HQW to Class C Sw ORW.

(2) The South River from Big Swamp to the Black River [Index Nos. 18-68-12-(0.5) and 18-68-12(11.5)] was reclassified from Classes C Sw and C Sw HQW to Class C Sw ORW.

(3) Six Runs Creek from Quewhiffle Swamp to the Black River [Index No. 18-68-2] was reclassified from Class C Sw to Class C Sw ORW.

(i) The Cape Fear River Basin Classification Schedule was amended effective September 1, 1994 with the reclassification of the Deep River [Index No. 17-(36.5)] from the Town of Gulf-Goldston water supply intake to US highway 421 including associated tributaries from Class C to Classes C, WS-IV and WS-IV CA.

(j) The Cape Fear River Basin Classification Schedule was amended effective August 1, 1998 with the revision to the primary classification for portions of the Deep River [Index No. 17-(28.5)] from Class WS-IV to Class WS-V, Deep River [Index No. 17-(41.5)] from Class WS-IV to Class C, and the Cape Fear River [Index 18-(10.5)] from Class WS-IV to Class WS-V.

(k) The Cape Fear River Basin Classification Schedule was amended effective April 1, 1999 with the reclassification of Buckhorn Creek (Harris Lake)[Index No. 18-7-(3)] from the backwaters of Harris Lake to the Dam at Harris Lake from Class C to Class WS-V.

(l) The Cape Fear River Basin Classification Schedule was amended effective April 1, 1999 with the reclassification of the Deep River [Index No. 17-(4)] from the dam at Oakdale-Cotton Mills, Inc. to the dam at Randleman Reservoir (located 1.6 mile upstream of U.S. Hwy 220 Business), and including tributaries from Class C and Class B to Class WS-IV and Class WS-IV & B. Streams within the Randleman Reservoir Critical Area have been reclassified to WS-IV CA. The Critical Area for a WS-IV reservoir is defined as 0.5 mile and draining to the normal pool elevation of the reservoir. All waters within the Randleman Reservoir Water Supply Watershed are within a designated Critical Water Supply Watershed and are subject to a special management strategy specified in Rule .0248 of this Subchapter.

(m) The Cape Fear River Basin Classification Schedule was amended effective August 1, 2002 as follows:

(1) Mill Creek [Index Nos. 18-23-11-(1), 18-23-11-(2), 18-23-11-3, 18-23-11-(5)] from its source to the Little River, including all tributaries was reclassified from Class WS-III NSW and Class WS-III B NSW to Class WS-III NSW HQW@ and Class WS-III B NSW HQW@.

(2) McDeed's Creek [Index Nos. 18-23-11-4, 18-23-11-4-1] from its source to Mill Creek, including all tributaries was reclassified from Class WS III NSW and Class WS-III B NSW to Class WS-III NSW HQW@ and Class WS-III B NSW HQW@.

The "@" symbol as used in this Paragraph means that if the governing municipality has deemed that a development is covered under a "5/70 provision" as described in Rule .0215(3)(b)(i)(E) of this Subchapter, then that development is not subject to the stormwater requirements as described in 15A NCAC 02H .1006.

(n) The Cape Fear River Basin Classification Schedule was amended effective November 1, 2004 as follows:

(1) the portion of Rocky River [Index Number 17-43-(1)] from a point 0.3 mile upstream of Town of Siler City upper reservoir dam to a point 0.3 mile downstream of Lacy Creek from WS-III to WS-III CA.

(2) the portion of Rocky River [Index Number 17-43-(8)] from dam at lower water supply reservoir for Town of Siler City to a point 65 feet below dam (site of proposed dam) from C to WS-III CA.

(3) the portion of Mud Lick Creek (Index No. 17-43-6) from a point 0.4 mile upstream of Chatham County SR 1355 to Town of Siler City lower water supply reservoir from WS-III to WS-III CA.

(4) the portion of Lacy Creek (17-43-7) from a point 0.6 mile downstream of Chatham County SR 1362 to Town of Siler City lower water supply reservoir from WS-III to WS-III CA.

(o) The Cape Fear River Basin Classification Schedule was amended effective November 1, 2007 with the reclassifications listed below, and the North Carolina Division of Water Resources maintains a Geographic Information Systems data layer of these UWLs.

(1) Military Ocean Terminal Sunny Point Pools, all on the eastern shore of the Cape Fear River [Index No. 18-(71)] were reclassified to Class WL UWL.

(2) Salters Lake Bay near Salters Lake [Index No. 18-44-4] was reclassified to Class WL UWL.

(3) Jones Lake Bay near Jones Lake [Index No. 18-46-7-1] was reclassified to Class WL UWL.

(4) Weymouth Woods Sandhill Seep near Mill Creek [18-23-11-(1)] was reclassified to Class WL UWL.

(5) Fly Trap Savanna near Cape Fear River [Index No. 18-(71)] was reclassified to Class WL UWL.

(6) Lily Pond near Cape Fear River [Index No. 18-(71)] was reclassified to Class WL UWL.

(7) Grassy Pond near Cape Fear River [Index No. 18-(71)] was reclassified to Class WL UWL.

(8) The Neck Savanna near Sandy Run Swamp [Index No. 18-74-33-2] was reclassified to Class WL UWL.

(9) Bower's Bog near Mill Creek [Index No. 18-23-11-(1)] was reclassified to Class WL UWL.

(10) Bushy Lake near Turnbull Creek [Index No. 18-46] was reclassified to Class WL UWL.

(p) The Cape Fear River Basin Classification Schedule was amended effective January 1, 2009 as follows:

(1) the portion of Cape Fear River [Index No. 18-(26)] (including tributaries) from Smithfield Packing Company's intake, located approximately 2 miles upstream of County Road 1316, to a point 0.5 miles upstream of Smithfield Packing Company's intake from Class C to Class WS-IV CA.

(2) the portion of Cape Fear River [Index No.18-(26)] (including tributaries) from a point 0.5 miles upstream of Smithfield Packing Company's intake to a point 1 mile upstream of Grays Creek from Class C to Class WS-IV.

(q) The Cape Fear River Basin Classification Schedule was amended effective August 11, 2009 with the reclassification of all Class C NSW waters and all Class B NSW waters upstream of the dam at B. Everett Jordan Reservoir from Class C NSW and Class B NSW to Class WS-V NSW and Class WS-V & B NSW, respectively. All waters within the B. Everett Jordan Reservoir Watershed are within a designated Critical Water Supply Watershed and are subject to a special management strategy specified in Rules .0262 through .0273 of this Subchapter.

(r) The Cape Fear River Basin Classification Schedule was amended effective September 1, 2009 with the reclassification of a portion of the Haw River [Index No. 16-(28.5)] from the Town of Pittsboro water supply intake, which is located approximately 0.15 mile west of U.S. 15/501, to a point 0.5 mile upstream of the Town of Pittsboro water supply intake from Class WS-IV to Class WS-IV CA.

(s) The Cape Fear River Basin Classification Schedule was amended effective March 1, 2012 with the reclassification of the portion of the Haw River [Index No. 16-(1)] from the City of Greensboro's intake, located approximately 650 feet upstream of Guilford County 2712, to a point 0.5 miles upstream of the intake from Class WS-V NSW to Class WS-IV CA NSW, and the portion of the Haw River [Index No. 16-(1)] from a point 0.5 miles upstream of the intake to a point 0.6 miles downstream of U.S. Route 29 from Class WS-V NSW to Class WS-IV NSW.

(t) The Cape Fear River Basin Classification Schedule was amended effective June 30, 2017 with the reclassification of a section of 18-(71) from upstream mouth of Toomers Creek to a line across the river between Lilliput Creek and Snows Cut from Class SC to Class SC Sw. A site-specific management strategy is outlined in 15A NCAC 02B .0227.

(u) The Cape Fear River Basin Classification Schedule was amended effective September 1, 2019 with the reclassification of a portion of Sandy Creek [Index No. 17-16-(1)] (including tributaries) from a point 0.4 mile upstream of SR-2481 to a point 0.6 mile upstream of N.C. Hwy 22 from WS-III to WS-III CA. The reclassification resulted in an updated representation of the water supply watershed for the Sandy Creek reservoir.

History Note: *Authority G.S. 143-214.1; 143-215.1; 143-215.3(a)(1);*
Eff. February 1, 1976;
Amended Eff. June 30, 2017; March 1, 2012; September 1, 2009; August 11, 2009; January 1, 2009; November 1, 2007; November 1, 2004; August 1, 2002; April 1, 1999; August 1, 1998; September 1, 1994; June 1, 1994; August 3, 1992; August 1, 1990;
Readopted Eff. ~~November 1, 2019.~~ November 1, 2019;
Amended Eff. Xxxxx.