UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8960

AUG 31 2010

Ms. Coleen H. Sullins
Director, Division of Water
North Carolina Department of
Environment and Natural Resources
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

SUBJECT: Approval of the State of North Carolina's 2010 303(d) List Submittal

Dear Ms. Sullins:

The U.S. Environmental Protection Agency (EPA), Region 4, has completed its review of the North Carolina Department of Environment and Natural Resources' Final 2010 Clean Water Act (CWA) section 303(d) list of water quality limited segments. EPA has determined that each of the water quality limited segments still requiring Total Maximum Daily Loads identified on the State's 2010 list meets the requirements of the CWA section 303(d) and its implementing regulations, 40 CFR 130.7. EPA hereby approves the State of North Carolina's decision to include each of the waters designated by the State in its 2010 303(d) list.

EPA is deferring action on the Waterville Reservoir, pending implementation of a plan of study to better determine water column dioxin concentrations. We look forward to working with you as expeditiously as possible to complete the additional sampling effort needed to make a final determination regarding impairment status of this water. Enclosed for your information is the accompanying decision document for this approval action.

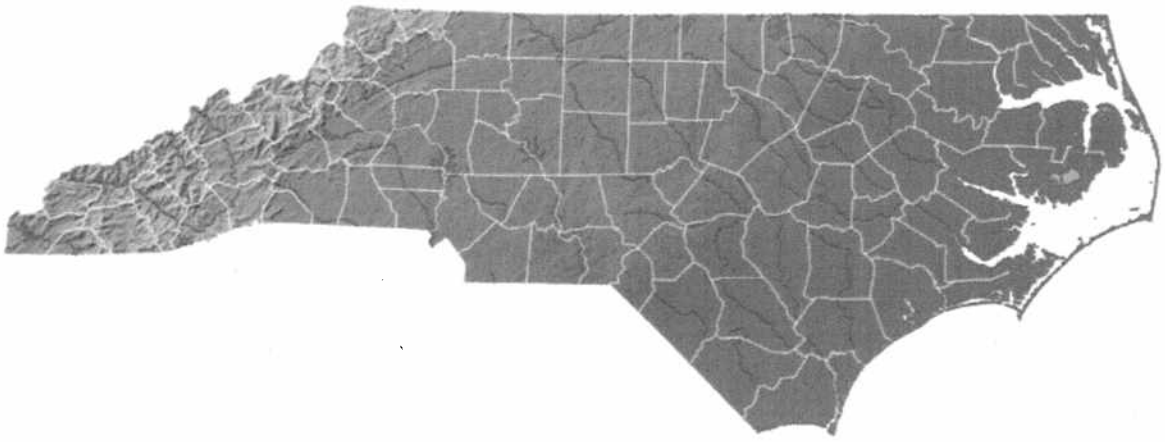
If you have questions concerning this matter, please contact me at (404) 562-9470 or Joanne Benante at (404) 562-9125.

Sincerely,

James D. Giattina
Director
Water Protection Division

Enclosure

DECISION DOCUMENT
FOR THE
APPROVAL OF THE
NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES'
2010 SECTION 303(d) LIST SUBMITTED ON
March 29, 2010



Prepared by the
U.S. Environmental Protection Agency, Region 4
Water Management Division

August 2010

I. Executive Summary

On March 29, 2010, the North Carolina Department of Environment and Natural Resources, Division of Water Quality (DWQ), submitted its final 2010 integrated section 305(b) report and section 303(d) list of impaired waters to the Environmental Protection Agency (EPA) for review. After a thorough review of North Carolina's submittal, EPA is approving the State's section 303(d) list. This Decision Document summarizes EPA's review and the basis for the Agency's decision.

Section 303(d)(1) of the Clean Water Act (CWA or Act) directs states to identify those waters within their jurisdictions for which effluent limitations required by section 301(b)(1)(A) and (B) are not stringent enough to implement any applicable water quality standard (referred to as water quality limited segments, defined in Title 40 of the *Code of Federal Regulations* (CFR) § 130.7), and to establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters. The section 303(d) listing requirement applies to water quality limited segments impaired by pollutant loadings from both point and/or nonpoint sources. After a State submits its section 303(d) list to EPA, the Agency is required to approve or disapprove that list.

This report updates the State's most recently approved section 303(d) list, approved by EPA on March 9, 2010 (the 2008 list). North Carolina's initial Public Review Draft of the 2010 section 303(d) list was issued on January 29, 2010. The State submitted the final list to EPA on March 29, 2010.

II. Statutory and Regulatory Background

A. Identification of Water Quality Limited Segments for Inclusion on the Section 303(d) List

Section 303(d)(1) of the Clean Water Act (Act) directs states to identify those waters within its jurisdictions for which effluent limitations required by sections 301(b)(1)(A) and (B) are not stringent enough to implement any applicable water quality standard, and to establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters. The section 303(d) listing requirement applies to waters impaired by point and/or nonpoint sources, pursuant to EPA's long-standing interpretation of section 303(d).

EPA regulations at 40 CFR 130.7(b)(1) state, "Each State shall identify those water quality-limited segments still requiring TMDLs within its boundaries for which: (i) Technology-based effluent limitations required by sections 301(b), 306, 307, or other sections of the Act; (ii) More stringent effluent limitations (including prohibitions) required by either State or local authority preserved by section 510 of the Act, or Federal authority (law, regulation, or treaty); and (iii) Other pollution control requirements (e.g., best management practices) required by local, State, or Federal authority are not stringent enough to implement any water quality standards (WQS) applicable to such waters."

EPA regulations define water quality limited segment as "[a]ny segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-based effluent limitations required by section 301(b) and section 306 of the Act." 40 CFR 130.2(j). Note: The term "water quality limited segment" as defined by federal regulations may also be referred to as "impaired waterbodies" or "impairments" throughout this decision document. TMDL is the acronym for Total Maximum Daily Load. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that load among the various sources of that pollutant.

EPA's *2006 Integrated Water Quality Monitoring and Assessment Report Guidance* (July 29, 2005) recommends the use of five categories to classify the water quality standard attainment status for each waterbody segment, or assessment unit. North Carolina currently uses the five categories recommended by EPA plus some additional sub-categories within those categories. A description of the State's sub-categories is provided in Appendix A.

Category 1: Attaining the water quality standard and no use is threatened. This category consists of those assessment units where all applicable use support categories are rated "Supporting." Data and information are available to support a determination that the water quality standards are attained and no use is threatened. Future monitoring data will be used to determine if the water quality standard continues to be attained. Because of a statewide fish consumption advisory for mercury in North Carolina, there are no Category 1 waters.

Category 2: Supporting or not Impaired for all monitored uses. This category consists of those assessment units where at least one of the applicable use support categories are rated "Supporting" and the other use support categories are rated "Not Rated" or "No Data." Data and information are available to support a determination that some, but not all, uses are attained. Attainment status of the remaining uses is unknown because there are insufficient or no data or information. Future monitoring data will be used to determine if the uses previously found to be in attainment remain in attainment, and to determine the attainment status of those uses for which data and information were previously insufficient to make a determination.

Category 3: No data or insufficient information to determine if any designated use is attained. Supplementary data and information, or future monitoring, will be required to assess the attainment status.

Category 4: Impaired or threatened for one or more designated uses but does not require the development of a TMDL because:

4a: A TMDL has been completed. This category consists of those assessment units for which EPA has approved or established a TMDL and water quality standards have not yet been achieved. Monitoring data will be considered before moving an assessment unit from Category 4a to Categories 1 or 2.

4b: Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future. This category consists of those assessment units for which TMDLs will not be developed because other required regulatory controls (e.g., NPDES permit limits, Stormwater Program rules, implemented watershed plan, etc.) are expected to attain water quality standards within a reasonable amount of time. Future monitoring will be used to verify that the water quality standard is attained as expected.

4c: Impairment is not caused by a pollutant, but by pollution. This category consists of assessment units that are impaired by pollution, not by a pollutant. EPA defines pollution as "The man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of the water." See section 502(19) of the Clean Water Act. This category is primarily intended to be used for impairments related to water control structures such as dams. Future monitoring will be used to confirm that there continues to be an absence of pollutant-caused impairment and to support water quality management actions necessary to address the cause(s) of the impairment.

Category 5: Impaired for one or more designated uses by a pollutant(s), and requires a TMDL. This category consists of those assessment units that are impaired by a pollutant and the proper technical conditions exist to develop TMDLs. When more than one pollutant is associated with the impairment of a single assessment unit in this category, the assessment unit will remain in Category 5 until TMDLs for all listed pollutants have been completed and approved by the EPA. The North Carolina 2010 section 303(d) list consists of those waterbodies placed in Category 5.

B. Consideration of Existing and Readily Available Water Quality Related Data and Information (40 CFR Part 130.7(b)(5)(i-iv))

In developing section 303(d) lists, states are required to assemble and evaluate all existing and readily available water quality-related data and information, including, at a minimum, consideration of existing and readily available data and information about the following categories of waters: (1) waters identified as partially meeting or not meeting designated uses, or as threatened, in the State's most recent section 305(b) report; (2) waters for which dilution calculations or predictive modeling indicate non-attainment of applicable standards; (3) waters for which water quality problems have been reported by governmental agencies, members of the public, or academic institutions; and (4) waters

identified as impaired or threatened in any section 319 nonpoint assessment submitted to EPA. See 40 CFR 130.7(b)(5). In addition to these minimum categories, states are required to consider any other water quality-related data and information that is existing and readily available. EPA's *1991 Guidance for Water Quality-Based Decisions* describes categories of water quality-related data and information that may be existing and readily available. See Appendix C of *Guidance for Water Quality-Based Decisions: The TMDL Process*, EPA Office of Water, 1991 ("EPA's 1991 Guidance"). While states are required to evaluate all existing and readily available water quality-related data and information, states may decide to rely or not rely on particular data or information in determining whether to list particular waters.

In addition to requiring states to assemble and evaluate all existing and readily available water quality-related data and information, EPA regulations at 40 CFR 130.7(b)(6) require states to include, as part of its submissions to EPA, documentation to support decisions to list or not list waters. Such documentation needs to include, at a minimum, the following information: (1) a description of the methodology used to develop the list, (2) a description of the data and information used to identify waters, (3) a rationale for any decision to not use any existing and readily available data and information, and (4) any other reasonable information requested by the Region.

C. Priority Ranking

EPA regulations also codify and interpret the requirement in section 303(d)(1)(A) of the Act that states establish a priority ranking for listed waters. The regulations at 40 CFR 130.7(b)(4) require states to prioritize waters on their section 303(d) lists for TMDL development, and also to identify those impaired waterbodies targeted for TMDL development in the next two years. In prioritizing and targeting waters, states must, at a minimum, take into account the severity of the pollution and the uses to be made of such waters. CWA § 303(d)(1)(A). As long as these factors are taken into account, the Act provides that states establish priorities. States may consider other factors relevant to prioritizing waters for TMDL development, including immediate programmatic needs; vulnerability of particular waters as aquatic habitats; recreational, economic, and aesthetic importance of particular waters; degree of public interest and support; and state or national policies and priorities.

III. Analysis of the North Carolina Submittal

A. Review of North Carolina's Identification of Waters (40 CFR 130.7(b)(6)(i - iv))

In reviewing North Carolina's submittal, EPA first reviewed the methodology used by the State to develop the list update in light of the State's approved water quality standards, and then reviewed the actual list of waters. This section describes the State's listing methodology and outlines EPA's evaluation of both that methodology and the actual list of impaired waterbodies included in the submittal. In cases where EPA could not determine if the State's listing methodology identified all impaired waterbodies for a given designated use or water quality criteria, EPA conducted a review of water quality data to determine whether any waterbodies should be added to the section 303(d) list.

Each of the assessment and listing methodologies contained in the 2010 Integrated Report was compared against the North Carolina water quality standards as found in the *North Carolina Division of Water Quality "Redbook" (Surface Waters and Wetlands Standards, North Carolina Administrative Code 15A NCAC 02B .0100, .0200 & .0300*; amended effective May 1, 2007, hereafter "North Carolina Water Quality Standards"). Information on monitoring procedures was obtained from the DWQ Monitoring Program Strategy (Version 2.1, April 2009), as well as DWQ's Basinwide Assessment Reports and Basinwide Water Quality Plans.

1. North Carolina's Water Quality Standards and Section 303(d) List Development

The Clean Water Act requires each State to identify and prioritize those waters where technology-based controls are inadequate to implement water quality standards:

> *Each State shall identify those waters within its boundaries for which the effluent limitations required by section 1311(b)(1)(A) and section 1311(b)(1)(B) of this title are not stringent enough to implement any water quality standards applicable to such waters.* 33 U.S.C. 1313(d)(1)(A); see also 40 CFR 130.7(b) (EPA section 303(d) listing regulations).

EPA regulations expressly provide that "[f]or purposes of listing waters under 130.7(b), the term 'water quality standard applicable to such waters' and 'applicable water quality standards' refer to those water quality standards established under section 303 of the Act, including numeric criteria, narrative criteria, water body uses, and anti-degradation requirements." 40 CFR 130.7(b)(3). EPA's review of the North Carolina section 303(d) list ensures that the list identifies water quality limited segments consistent with existing State standards.

Water quality criteria can be expressed either as narrative or numeric criteria. Numeric criteria typically establish either a maximum level or a range of levels of a pollutant which can be present in the waterbody while still attaining water quality standards. Narrative criteria typically describe a condition (e.g., waters shall be suitable for aquatic life propagation and maintenance of biological integrity) which must be met for the waterbody to meet water quality standards. Determining whether a waterbody is meeting water quality standards for narrative criteria requires the identification of reference points against which the waterbody can be evaluated. EPA defers to a State's interpretation of its water quality standards, including how narrative criteria should be interpreted, when that interpretation is consistent with the underlying narrative criteria and is a reasonable translation of those criteria.

Narrative Water Quality Criteria

The following is a list of the primary narrative criteria considered in North Carolina's water quality assessment. The sections below summarize EPA's review of the State's methodology against these narrative criteria.

- North Carolina Administrative Code (NCAC) 15A 02B .0208 (Narrative for toxics and temperature).
- NCAC 15A 02B .0211 (Several narratives relate to making all fresh waters suitable for aquatic life propagation and maintenance of biological integrity, wildlife, secondary recreation and agriculture).
- NCAC 15A 02B .0220 (Several narratives relate to making all salt waters suitable for aquatic life propagation and maintenance of biological integrity, wildlife, and secondary recreation).
- NCAC 02B 15A .0231 (Narratives related to wetlands).

Numeric Criteria

The primary numeric criteria related to water quality assessment in North Carolina are detailed in 15A NCAC 02B .0100 and .0200 (amended effective date August 1, 2004). The State expresses its numeric water quality criteria in a variety of ways, which are delineated for each parameter in the following sections. In general, numeric criteria are written as "maximum permissible levels" or values which "shall not be exceeded."

2. Consideration of Existing and Readily Available Water Quality-Related Data and Information

Federal regulations provide that each state "shall assemble and evaluate all existing and readily available water quality-related data and information to develop the list required by §§ 130.7(b)(1) and 130.7(b)(2)." 40 CFR 130.7(b)(5). The North Carolina DWQ collects a variety of biological, chemical, and physical data from six primary programs, including benthic macroinvertebrates, fish community, fish tissue, lake assessment, ambient monitoring, and aquatic toxicity monitoring.

Sources routinely used for data and information include the following: previous section 303(d) lists; Clean Water Act section 305(b) reports; Clean Water Act section 319 nonpoint source assessments; waterbodies where specific fishing or shellfish bans and/or advisories are currently in effect; waterbodies identified by the State as impaired in its most recent Clean Lake Assessment conducted under section 314 of the CWA; drinking water source water assessments under section 1453 of the Safe Drinking Water Act; trend analyses and predictive models used for determining designated use, numeric and narrative standard compliance; and data, information, and water quality problems reported from local, State, or Federal agencies, Tribal governments, members of the public, and academic institutions.

DWQ maintains a standing solicitation for data on their website (http://portal.ncdenr.org/web/wq/ps/mtu/assessment). For data to be used for impairment determinations, data must meet specific submission criteria, including quality assurance and quality control of the collection and analysis of the data.

In the past, DWQ assessed use support for each river basin according to a five-year rotating schedule, such that only a subset of basins were updated for a given cycle.

Beginning with the 2008 section 303(d) list, use support was assessed for all basins statewide. The 2010 list is based on all data collected in calendar years 2004 through 2008. Some waterbodies may have biological data collected earlier for waters that have not been re-sampled during this data window or where the current impairment is based on that sample.

According to DWQ's Use Assessment Methodology, a minimum of ten samples is needed to be considered for use support assessments. The Methodology states that if fewer than ten samples are collected and greater than ten percent of the samples exceed the numeric criteria, the assessment unit will be Not Rated and targeted for further sampling (Category 3a). DWQ's monitoring program routinely collects more than ten samples, with the exception, historically, for some lakes. Lakes are now targeted for more sampling.

EPA Conclusion

North Carolina's assessment methodology contains provisions, as described above, for limiting the use of data based on the age of data (five year window) and sample size (at least ten samples). North Carolina does include older data in their assessment when no current data is available. However, EPA recommends that older data not be automatically excluded, particularly when its inclusion could be used to augment small sets of more current data.

EPA identified the State's provisions as being overly restrictive and conducted a data review to determine if waters, which should be considered impaired, may have been omitted from the list due to these provisions. EPA conducted the review by reviewing all data received from DWQ for the applicable data window (2004 through 2008). Data sets which contained fewer than ten data points were examined to see if there were elevated levels of pollutants. EPA did not identify any waters that should be added to the 2010 section 303(d) list due to elevated levels in small data sets.

In order for EPA to conclude that the State's process is consistent with federal requirements for consideration of data and information, the State should revise its methodology to allow consideration of older data and data contained within smaller data sets for future section 303(d) lists.

3. Assessment Unit Delineation Approach/Geo-referencing

North Carolina maintains a water quality assessment database, which for each assessment unit provides a description, use support ratings, parameters of interest, potential stressors and sources as well as the capability to track changes through time. This database is linked with other North Carolina water quality databases including ambient, benthic and fish community data as well as the 1:24,000 hydrography. Assessment units are delineated to the 1:24,000 statewide hydrography and can be easily located using a Geographic Information System (GIS). The State has completed georeferencing statewide including indexing assessment units to the high resolution National Hydrography Dataset (NHD).

EPA Conclusion

The State provided a GIS dataset of the State's assessment units at NHD 1:24,000 scale. For previous 303(d) lists, EPA contractor RTI geo-referenced this dataset to NHD 1:100,000 scale for inclusion in the EPA Reach Address Database. For the 2010 303(d) list DWQ posted draft GIS data on its website and will finalize the data on EPA approval (http://portal.ncdenr.org/web/wq/ps/mtu/assessment).

4. Aquatic Life Use Support

The State considers biological and ambient monitoring data in assessing the aquatic life use support category. EPA separated its review of North Carolina's assessment of aquatic life use support into five categories, as follows: waterbodies not listed due to natural conditions; assessment based on physical (naturally variable) parameters, nutrient enrichment in lakes and flowing waters, biological indicators; and toxic/non-conventional pollutants.

a. Waterbodies Not Listed Due to Natural Conditions

North Carolina is not required to list waterbodies where it determined that measured concentrations of pH (potential of Hydrogen ions, a measure of acidity or alkalinity) or dissolved oxygen (DO) do not meet the numeric criteria due to natural conditions. North Carolina's water quality standards address natural conditions, providing that "natural waters may on occasion, or temporarily, have characteristics outside of the normal range established by the standards. The adopted water quality standards relate to the condition of waters as affected by the discharge of sewage, industrial wastes or other wastes including those from nonpoint sources and other sources of water pollution. Water quality standards will not be considered violated when values outside the normal range are caused by natural conditions. Where wastes are discharged to such waters, the discharger will not be considered a contributor to substandard conditions provided maximum treatment in compliance with permit requirements is maintained and, therefore, meeting the established limits is beyond the discharger's control." (15A NCAC 02B .0205)

North Carolina has assigned a supplemental classification category for Swamp Waters (Sw) which is intended to recognize those waters that generally have naturally occurring very low velocities, low pH and low dissolved oxygen. State water quality standards acknowledge that DO and pH may be natural conditions that are outside the required standard range. For DO, 15A NCAC 02B .0211(3) (b) states, "swamp water, lake coves or backwaters, and the lake bottom waters may have lower values if caused by natural conditions." For pH, 15A NCAC 02B .0211(3) (g) states, "...swamp waters may have a pH as low as 4.3 if it is the result of natural conditions."

If DWQ identifies natural condition waters with point source discharges, DWQ conducts an analysis of the likely impact of the discharges. The waters will be listed if the discharges may be contributing to the low DO or pH. For the 2010 section 303(d) list, DWQ's assessment methodology for classified swamp waters and for waters identified as swamp-like is as follows:

A classified swamp (Sw) AU was not rated for aquatic life when greater than 10% of DO samples were below 4 mg/l (5 for salt) for instantaneous samples (monthly) or when greater than 10% of samples were below a daily average of 5 mg/l (freshwater only). There is not a numerical standard for these water bodies and natural background conditions cannot be determined. This is a category 3a listing not requiring a TMDL.

A swamp like AU (not classified Sw) was not rated for aquatic life when greater than 10% of DO samples were below 4 mg/l (5 for saltwater) for instantaneous samples (monthly) or when greater than 10% of samples were below a daily average of 5mg/l (freshwater only) and when greater than 10% of samples were below a pH of 6.0 (SU) for freshwater or 6.8 (SU) for saltwater. Geographic location, biological data, tributary classifications, discharges and land use were considered when making use support determinations on waters considered to be swamp like or receiving significant swamp water input.

A classified swamp (Sw) AU was assessed as Impaired when greater than 10% of pH samples were below 4.3 (SU). A non-swamp water AU was assessed as Impaired for aquatic life when greater than 10% of samples were below a pH of 6.0 (SU) for freshwater or 6.8 (SU) for saltwater.

EPA Conclusion

DWQ has identified waterbodies containing low pH and DO which are believed due to natural conditions. For the 2010 list cycle, these are generally slow-moving blackwater streams, low-lying swamps and productive estuarine waters in the Coastal Plain. Based on the available data and information, North Carolina's decision that these waterbodies should be included in Category 3 rather than on the State's section 303(d) list is reasonable. However, these segments should be considered high priority for follow-up monitoring in order to confirm that the low pH and DO found in these waterbodies is due solely to natural conditions.

b. Impairments Indicated by Physical Parameters

Naturally variable physical parameters are those that fluctuate in a waterbody due to non-anthropogenic influences such as rainfall/flow, depth, time of day, salinity, etc. Naturally variable parameters assessed by DWQ during this listing cycle include dissolved oxygen (DO), pH, temperature and turbidity. Comparison against the North Carolina water quality standards is as follows (note: mg/l is milligrams per liter).

Water Quality Standard	**State Assessment Methodology**
Freshwater Dissolved Oxygen	

NCAC 15A 02B .0211(3)(b) Dissolved oxygen: not less than 6.0 mg/l for trout water, not less than a daily average of 5.0 mg/l with a minimum instantaneous value of not less than 4.0 mg/l; swamp waters, lakes coves or backwaters, and lake bottom waters may have lower values if caused by natural conditions (see section 4a, above). **Saltwater Dissolved Oxygen** **NCAC 15A 02B .0220(3)(b)** 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 (see section 4a, above).	Minimum of 10 samples or 10 daily averages. Criterion exceeded ≤10%: Supporting Criterion exceeded >10%: Impaired If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling.
Freshwater pH **NCAC 15A 02B .0211 (3)(g)** pH shall be normal for the waters in the area, which generally shall range 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 (see section 4a, above). **Saltwater pH** **NCAC 15A 02B .0220(3)(g)** pH shall be normal for the waters in the area, which generally shall range between 6.8 and 8.5.	Minimum of 10 samples. Criterion exceeded ≤10%: Supporting Criterion exceeded >10%: Impaired If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling.
Freshwater Temperature **NCAC 15A 02B .0211 (3)(j)**: not to exceed 2.8° C above the natural water temperatures, and in no case to exceed 29° C for mountain and upper piedmont waters and 32° C for lower piedmont and coastal plain waters. The temperature for trout waters shall not be increased by more than 0.5° C due to the discharge of heated liquids but in no case to exceed 20° C. **Saltwater Temperature** **NCAC 15A 02B .0220(3)(k)**	Minimum of 10 samples. Criterion exceeded ≤10%: Supporting Criterion exceeded >10%: Impaired If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling. A trout water (Tr) AU was not rated for aquatic life when greater than 10% of samples were greater than 20° C. The presence of heated discharges was not determined. This is a

Temperature shall not be increased above the natural water temperature by more than 0.8° C during June, July and August nor more than 2.2° C during other months and in no cases to exceed 32° C due to the discharge of heated liquids.	Category 3a listing (instream data inconclusive). A waterbody that exceeds the above criteria may be not rated for aquatic life because of meteorological conditions that occur on a regular basis. These conditions must be documented and reassessment will occur after more normal conditions return. This is a category 3a listing (instream data inconclusive). Examples of extreme conditions may include extreme drought, reservoir drawdown, hurricane impacts and flooding, dam failure, and saltwater encroachment. Other extreme conditions may be documented as needed for future assessments.
Turbidity **NCAC 15A 02B .0211 (3)(k)** 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 conditions the existing turbidity level cannot be increased. (Additional information on Best Management Practices are listed, as well)	Minimum of 10 samples. Criterion exceeded ≤10%: Supporting Criterion exceeded >10%: Impaired If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling.

The State currently does not list trout waters for temperature excursions where thermal discharges are present because they have not determined background conditions. EPA recommends that the State begin a monitoring program to determine background conditions and to assess such waters.

The State's water quality standards for DO, pH and turbidity do not specify an allowable percent of samples outside of the criteria. However, North Carolina's use of a ten percent threshold for determining use support for naturally variable parameters is consistent with EPA's guidance (*2006 Integrated Water Quality Monitoring and Assessment Report Guidance,* July 29, 2005; and *Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement,* EPA-841-B-97-002B, p.3-17.) Other EPA guidance (*Consolidated Assessment and Listing Methodologies*, July 2002, "CALM") recommends that the "state's assessment and listing methodology should describe how chemical data are collected and how they are used to determine the attainment of WQS." The web page for DWQ's Ambient Monitoring System references a draft standard operating procedure

(*Intensive Survey Unit Standard Operating Procedures*, August 2003) that provides additional information on the collection of samples which satisfies that provision.

EPA conclusion

DWQ's methodology for assessment of DO, pH, temperature and turbidity is consistent with North Carolina's existing, EPA-approved water quality standards and with EPA regulations.

EPA does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. However, based on EPA's independent review of the existing and readily available data, the provisions of the State's methodology related to age of data and minimum sample size did not result in DWQ failing to identify any waters not attaining DO, pH, temperature and turbidity standards. EPA is, therefore, approving DWQ's listing decisions for DO, pH, temperature and turbidity. For trout waters, EPA recommends that the State begin a monitoring program for waters with thermal discharges.

c. Impairments Indicated by Nutrient Enrichment

North Carolina's water quality standards include a numeric criterion for chlorophyll *a*, which is used as an indicator of nutrient enrichment in waters of the State.

Water Quality Standard	**State Assessment Methodology**
NCAC 15A 2B .0211 (3) (a) "Chlorophyll *a*: 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 (n/a to lakes and reservoirs less than 10 acres in surface area)."	Minimum of 10 samples. Criterion exceeded ≤10%: Supporting Criterion exceeded >10%: Impaired If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling.

EPA conclusion

EPA has determined that North Carolina's use of a ten percent threshold for determining use support for chlorophyll *a* is consistent with North Carolina's existing, EPA-approved water quality standards.

EPA does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. However, based on EPA's independent review of the existing and readily available data, the provisions of the State's methodology related to age of data and minimum sample size did not result in

DWQ failing to identify any waters not attaining chlorophyll *a* standards. EPA is, therefore, approving DWQ's listing decisions for chlorophyll *a*.

d. Impairments Indicated by Biological Information

EPA reviewed North Carolina's listing methodology for assessment of Aquatic Life designated use support indicated by biological monitoring. North Carolina's water quality standards include a narrative for biological integrity applicable to all Class C waters, as follows.

Water Quality Standard	**State Assessment Methodology**
NCAC 15A 2B .0211 (2) "The waters shall be suitable for aquatic life propagation and maintenance of biological integrity, wildlife, secondary recreation and agriculture; sources of water pollution which preclude any of these uses on either a short-term or long-term basis shall be considered to be violating a water quality standard."	**Benthic macroinvertebrate:** Bioclassifications assigned ranging from Poor to Excellent in flowing fresh waters based on the number of taxa present in the pollution intolerant aquatic insect groups and the North Carolina Biotic Index (NCBI). Classifications are translated into use support categories. If the NCBI is Severe Stress (for Swamp waters), Fair or Poor, the waterbody is Impaired.
NCAC 15 A 2B .0202 (11) Biological integrity is defined as "...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."	**Fish community:** North Carolina Index of Biotic Integrity (NCIBI) used to assess a stream's biological integrity by examining the structure and health of its fish community. NCIBI is translated into use support categories. If the NCIBI is Severe, Poor or Fair, the waterbody is Impaired.

If an assessment unit had been previously assessed as biologically impaired for aquatic life, and DWQ has since identified the stressor(s) as being other aquatic life standards violations, DWQ places the biological impairment in Category 4s. DWQ does not develop TMDLs for biological impairment, but rather conducts further assessment to identify the cause of the biological impairment. Once DWQ identifies the stressor(s) (i.e. the other aquatic life standards violations), the waterbody is listed in Category 5 for the identified standards violation and would then require a TMDL. If no stressors are identified, the waterbody remains in Category 5.

Benthic macroinvertebrate and fish community assessments are completed by the DWQ Biological Assessment Unit. The most recent Standard Operating Procedures for macroinvertebrate and fish community assessment, data and scores and ratings are available on the DWQ website (http://h2o.enr.state.nc.us/esb/BAUwww/benthossop.pdf). If both macroinvertebrate and fish community data are available, both are used to

evaluate use support. The State's use of multiple assemblages is in conformance with EPA's recommendation in the 2002 CALM guidance that the use of more than one biological index enhances "confidence in the assessment finding."

EPA Conclusion

The DWQ assessment listing methodology for biological data is consistent with North Carolina's existing, EPA-approved water quality standards and EPA regulations. EPA is approving DWQ's listing decisions based on biological data.

e. Impairments Indicated by Toxic and Non-Conventional Pollutants

Many pollutants which exert a toxic effect in water react and behave differently in the environment than the naturally variable pollutants discussed above. Unlike the naturally variable pollutants described above, toxic and non-conventional pollutants do not generally have wide variability in concentration under natural conditions that would still be protective of the designated use. Therefore, EPA carefully considered waterbodies with data related to toxic and non-conventional pollutants when reviewing North Carolina's section 303(d) list. In considering this data, EPA paid particular attention to the magnitude and duration of any exceedances, and also considered any compensating periods of time when no exceedances were observed. See the Technical Support Document for Water Quality-based Toxics Control, Appendix D - Duration and Frequency, U.S. Environmental Protection Agency, March 1991, EPA/505/2-90-001 (http://www.epa.gov/npdespub/pubs/owm0264.pdf).

North Carolina's numeric water quality standards for toxic and non-conventional pollutants are listed as "maximum permissible levels to protect aquatic life applicable to all fresh surface waters" (NCAC 15A 02B .0211(3) (l)).

Parameter	**Water Quality Standard NCAC 15A 02B .0211(3)(l)**	**State Assessment Methodology**
Arsenic	50 ug/l	Minimum of 10 samples. An assessment unit was assessed as Impaired for aquatic life when greater than 10% of samples were greater than the above standards. If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling.
Chromium	50 ug/l (Total recoverable)	
Lead	25 ug/l (Total recoverable)	
Cadmium	0.4 ug/l for trout waters and 2.0 ug/l for non-trout waters.	
Nickel	88 ug/l Cadmium and Nickel criteria are based on total recoverable metals concentrations unless appropriate studies have	

	been conducted to translate total recoverable metals to a toxic form.	

North Carolina's water quality standards include "Action Levels" for several toxic substances, including copper, iron, silver, and zinc. These compounds are considered to be non-bioaccumulative and have variable toxicity to aquatic life because of chemical form, solubility, stream characteristics or associated waste characteristics. Action levels have been typically used as a screen for potentially toxic impacts in receiving waters related to National Pollutant Discharge Elimination System (NPDES) permits (15A NCAC 02B .0211(4)). It should be noted, however, that the Action Level concept is intended to be used only for National Pollutant Discharge Elimination System (NPDES) permits. The North Carolina water quality standard goes on to state that, "[f]or purposes other than consideration of NPDES permitting of point source discharges...the Action Levels in this Rule...shall be considered as numerical ambient water quality standards."

Parameter	**Water Quality Standard 15A NCAC 02B .0211(4)**	**State Assessment Methodology**
Copper	7 ug/l	Minimum of 10 samples. (continued next page)
Iron	1.0 mg/l	An assessment unit was assessed as Impaired for aquatic life when greater than 10% of samples were greater than the above standards.
Zinc	50 ug/l	
Silver	0.06 ug/l	If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling. Iron was not assessed because the standard is being reevaluated and iron exceedances have been shown to be a natural condition. NC does not routinely monitor for silver. DWQ will review Copper and Zinc assessments that result in Category 5 listings to determine if the listing is appropriate. The review takes into account several lines of information including collocated biological ratings, quality of data and possibility of natural conditions.

"Ten percent" Methodology

For toxic pollutants, EPA guidance recommends use of one-exceedance-in-three-years frequency for listing decisions. According to the *Consolidated Assessment and Listing Methodology (CALM)–Toward a Compendium of Best Practices*, July 2002, EPA recommends that acute and chronic aquatic life criteria for toxics not be exceeded more than once every three-year period (1-in-3) on the average. The guidance states "EPA selected this frequency to provide a level of protection similar to the 7Q10 design flow or low-flow condition. The exceedance frequency recommendation is considered protective. Like the magnitude and duration components of the water quality criteria, it may also be revised to reflect site-specific information on exposure and response relationships." A state may use an alternative methodology to assess waters where the state has provided a scientifically defensible rationale that its methodology is no less stringent than EPA's recommended water quality standards.

DWQ's assessment methodology states: "An assessment unit was assessed as Impaired for aquatic life when greater than 10% of samples were greater than the above standards." EPA has reviewed the justification North Carolina submitted supporting its listing methodology for toxic and non-conventional pollutants and does not believe the State has demonstrated that the ten percent frequency methodology for toxics is no less stringent than the 1-in-3 frequency methodology recommended in EPA's assessment guidance.

However, for the 2010 section 303(d) list cycle, given the amount of data available in North Carolina, the ten percent exceedance methodology results in the same (or more) listings as the EPA-recommended frequency. For this list cycle, North Carolina listed no new waters based on metals impairments other than copper and zinc (see section below on copper and zinc), and based on EPA's independent review of the available data and information, EPA concurs with the State's conclusions relating to metals impairments in the 2010 list.

Action Level - Iron

DWQ provided USGS data to support the determination that high iron in many NC surface waters is a natural condition. EPA Region 4 analyzed the information and concurs that the levels of iron found do appear to be naturally occurring, related to the sediment in streams and the geochemistry of the ecoregions within the state.

Action Levels - Copper and Zinc

In the past, DWQ used their action level metals monitoring data only to screen waters for potential problems. For the NC 2006 section 303(d) list, DWQ did not assess use support for action level metals but committed to developing a scientifically defensible methodology for the 2008 list cycle. In the meantime, DWQ began the process to revise all of their metals standards.

North Carolina's initial submittal on April 1, 2008, of its 2008 section 303(d) list methodology for the action level metals stated that "exceedances of the 10% criterion were not adequate indicators of impacts to ecological / biological integrity in North Carolina waters due to high naturally occurring levels and were not used to assess waters as Impaired." DWQ provided scientific documentation that indicated that elevated levels of iron in NC streams are naturally occurring statewide (see section on Iron, above); however, EPA does not agree that the same argument can be made for copper and zinc.

In November 2008, DWQ proposed a revised methodology that placed more reliance on biological data. While EPA supports the use of a multiple line of evidence approach, DWQ's proposal placed an exceedingly high value on biological assessment over chemical data. EPA's *Policy on the Use of Biological Assessments and Criteria in the Water Quality Program* (Memorandum from T.T. Davis, Director, Office of Science and Technology to Water Management Division Directors, Regions 1-10, June 19, 1991) states: "Because biosurvey, chemical-specific and toxicity testing methods have unique as well as overlapping attributes, sensitivities, and program applications, no single approach for detecting impact should be considered uniformly superior to any other approach. EPA recognizes that each method can provide valid and independently sufficient evidence of aquatic life use impairment, irrespective of any evidence, or lack of it, derived from the other two approaches. The failure of one method to confirm an impact identified by another method would not negate the results of the initial assessment. This policy, therefore, states that appropriate action should be taken when any one of the three types of assessment determines that the standard is not attained. States are encouraged to implement and integrate all three approaches into their water quality programs and apply them in combination or independently as site-specific conditions and assessment objectives dictate." DWQ did not provide sufficient information to show that the State's proposed combination of biological and chemical methods are protective.

EPA and DWQ subsequently came to an agreement which led to withdrawal of the State's initial 2008 list submittal. DWQ submitted a revised methodology and 2008 section 303(d) list on February 5, 2010. In some cases when copper or zinc exceeded the criteria but biological sampling indicated no impairment (or in the absence of biological data), DWQ conducted additional reviews to determine use support of waters potentially impaired by these metals. The review consisted of an evaluation of all available relevant information, including, but not limited to, natural or background conditions, sample quality and representativeness of data. DWQ subsequently added copper and/or zinc impairments to 74 waterbodies on the 2008 section 303(d) list. For the 2010 section 303(d) list, DWQ's review resulted in 8 assessment units newly listed for copper and/or zinc (5 copper only, 1 zinc only and 2 copper/zinc combinations). A table of all new listings is provided in Appendix B.

The initial review for the 2008 303(d) list also resulted in a list of 17 assessment units requiring further investigation for potential impairments of copper and/or zinc (listed in Appendix D). EPA anticipates that these 17 waterbodies will be treated as high-priority for additional assessment monitoring during 2012 listing cycle.

EPA Conclusion

EPA Region 4 concurs that the levels of iron found appear to be naturally occurring. EPA recommends, and the state has agreed, that DWQ will continue to assess iron data to identify any waters with high levels not attributable to natural conditions.

As described above, DWQ and EPA Region 4 worked together to develop an acceptable methodology that DWQ used to assess copper and zinc for the 2008 and 2010 lists. High priority follow-up monitoring during the next listing cycle is recommended for the 17 waterbodies identified as potentially impaired for copper and zinc. In an internal memo dated April 9, 2010, DWQ indicated its intention to conduct metals sampling at "assessment units identified for 303(d) additional metals sampling." Monitoring and assessment of those and all waterbodies must be based on North Carolina's EPA-approved water quality standards which might include any revised metals standards that have been approved by EPA prior to the next listing cycle.

As discussed earlier in this section, EPA has not determined that use of the "> 10% exceedence" test is a reasonable method for DWQ to assess toxic or non-conventional pollutants consistent with the State's currently applicable, EPA-approved water quality standards. EPA also does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. However, based on EPA's independent review, the provisions of the State's methodology related to age of data, minimum sample size, and toxic or non-conventional pollutants did not result in DWQ failing to identify any waters not attaining toxic or non-conventional pollutant water quality standards. EPA is, therefore, approving DWQ's listing decisions for toxic and non-conventional pollutants.

5. Fish Consumption Use Support

Class C waters are freshwaters protected for several uses, including fishing. Class SC is saltwater protected for several uses including fishing. All waters in the state are protected at a minimum at the Class C or SC level. The fish consumption use support category is based on protecting human health, so these waters are assessed to determine whether humans can safely consume fish from a particular waterbody.

Water Quality Standard	State Assessment Methodology
15A NCAC 02B.0211(l)(ix) Mercury (max. permissible level): 0.012 µg/l **NCAC 15A 02B .0208(a)(2) Standards for Toxic Substances and Temperature** Human Health Standards: The concentration of toxic substances will not exceed the level necessary to protect human health through exposure routes of fish (or shellfish) tissue consumption, water consumption, or other	Fish Consumption was assessed based on site-specific fish consumption advisories which were based on fish tissue data. Because of the statewide Mercury advisory there were no cases for Supporting fish consumption. ***PCBs and Dioxin Assessment Criteria*** An assessment unit was assessed as Impaired when a site-specific advisory was posted for

route identified as appropriate for the water body. (A) For non-carcinogens, WQS or criteria used to calculate water quality based effluent limitations to protect human health for fish consumption. (B) For carcinogens: WQS applicable to protect human health from carcinogens through the consumption of fish are: Aldrin: 0.05 ng/l Arsenic: 10 µg/l Benzene: 51 µg/l Carbon tetrachloride: 1.6 µg/l Chlordane: 0. 8 ng/l DDT: 0.2 ng/l Dieldrin: 0.144 ng/l Dioxin: 0.000005 ng/l (0.005 ppq) Heptachlor: 0.08 ng/l Hexachlorobutadiene: 18 µg/l PCBs: 0.064 ng/l PAHs: 31.1 ng/l Tetrachloroethylene (1,1,2,2): 4 µg/l Tetrachloroethylene: 3.3 µg/l Trichloroethylene: 30 µg/l Vinyl chloride: 2.4 µg/l	PCBs or dioxins, respectively. ***Mercury Assessment Criteria*** An assessment unit was assessed as Impaired for fish consumption when greater than 10% of samples were greater than 0.012 µg/l. A minimum of 10 samples was needed to rate the water as Impaired. If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted for further sampling. This is a category 3a listing not requiring a TMDL. Statewide advice for Mercury in fish tissue was not assessed because it was not associated with a specific assessment unit but was applied to all waters of the State. Previous Category 5 listings for Mercury based on site specific advisories will remain in place.

The Monitoring Program Strategy states that DWQ conducts fish tissue testing for mercury, selenium, cadmium, PCBs and pesticides. Data are provided to the North Carolina Department of Health and Human Services (DHHS) for that agency to make the fish consumption advisory.

Dioxins in Waterville Reservoir

EPA Region 4's independent analysis of fish tissue data from Waterville Reservoir indicates a probable WQS exceedance of dioxin in the water column. DWQ's assessment methodology for dioxin is based on fish consumption advisories issued by DHHS, not an evaluation of compliance with the WQS. DWQ has listed the Pigeon River and Waterville Reservoir in the past based on fish advisories. However, levels in fish tissue (monitored annually) have been declining and, when the fish advisories were dropped, these waterbodies were removed from NC's 303(d) list. The presence of an advisory indicates impairment, however, lack of an advisory does not necessarily indicate lack of impairment.

The NC WQS for dioxin is given as a water column number (0.005 parts per quadrillion, or ppq). Levels in the water column are below detection limits with normal analytical methods. Because dioxin bioaccumulates in aquatic organisms, fish tissue data is used to determine use support. However, the level of dioxin in fish tissue which

triggers a fish consumption advisory in the state (3.0 parts per trillion, or ppt) is less stringent than the level (0.025 ppt; see calculation below) that would indicate the water is not attaining the WQS for dioxin.

Since the time that Blue Ridge Paper Products, a facility upstream of the Reservoir, stopped releasing detectable levels of dioxin in the early 1990s, levels in fish tissue have been declining. EPA Region 4's review of the Blue Ridge Paper Products NPDES permit renewal in 2009 led to review of recent fish tissue data in Pigeon River and Waterville Reservoir (no probable exceedances were found in the Pigeon River). Though the current fish tissue data for Waterville Reservoir does not trigger a fish advisory, EPA conducted back calculations of this fish tissue data to determine the level of dioxin in the water column, and these calculations indicate that the water column levels are elevated.

EPA used dioxin levels in carp tissue in Waterville Reservoir to conduct the back calculation of water column levels. In order to perform this analysis, EPA used the risk assumptions that were used to derive the current applicable NC WQS for dioxin to determine an equivalent fish tissue residue level.

$$\text{Criterion} = \frac{[\text{Body Weight}(\text{~~kg~~})] \cdot [\text{Cancer Risk Level}]}{[\text{CPF } (\text{mg}/\text{~~kg~~}/\text{~~day~~}^{-1})] \cdot [\text{FCR } (\text{~~kg~~}/\text{~~day~~})] \cdot [\text{BCF}(\text{l}/\text{~~kg~~})]}$$

Cancer risk level is 10^{-6}
Body weight is 70 kg
Cancer potency factor (CPF) is the EPA value of $1.56 \cdot 10^{5}$ mg/kg/day $^{-1}$
Fish consumption rate (FCR) is 17.5 g/day (0.0175 kg/day)
Bioconcentration factor (BCF) is 5000 l/kg
Criterion = 0.005 ppq = $5 \cdot 10^{-12}$ mg/l

$$70 \times 10^{-6} / [1.56 \cdot 10^{5} \times 0.0175 \times 5000] = 0.5 \cdot 10^{-11} = 5 \cdot 10^{-12} \text{ mg/l}$$

In order to calculate the fish tissue residue concentration that would result from a water column concentration equal to the criterion, the BCF (the concentration of a particular chemical in a tissue per concentration of chemical in water) is removed and the equation solved:

$$70 \times 10^{-6} / [1.56 \cdot 10^{5} \times 0.0175] = 2564 \cdot 10^{-11} = 0.025 \cdot 10^{-6}$$

Based on North Carolina's dioxin WQS of 0.005 ppq, the associated fish tissue value indicating impairment would be approximately 0.025 ppt.

Out of the last five years of fish tissue data collected by the facility, levels of dioxin detected in carp in Waterville Reservoir have been 1.1 to 1.3 ppt. Assuming a linear relationship between water column concentrations and fish tissue levels, these fish tissue concentrations would indicate a water column concentration in the range of 0.22 to 0.26 ppq, thus exceeding the State's numeric criterion of 0.005 ppq.

Based on the above data analysis, EPA has determined that it is likely the Waterville Reservoir continues to be impaired for dioxin. In order to further confirm the dioxin levels that currently exist in the water column of Waterville Reservoir, and make a determination about whether WQSs are currently being met, EPA has discussed with DWQ the use of high volume sampling. High volume sampling can achieve a much lower detection limit, allowing direct comparison of the water column monitoring data with the state water column WQS.

EPA Conclusion

EPA has determined that, in general, North Carolina's use of fish tissue data and fish consumption advisories is consistent with North Carolina's existing, EPA-approved WQSs. However, the methodology should allow flexibility to address site specific data as in the case of Waterville Reservoir. EPA's *Consolidated Assessment and Listing Methodology* guidance advises "...for fish and shellfish advisories for 'dioxin and dioxin-like compounds,' EPA recommends that because of the unique risk characterization issues, listing decisions should be made on a case-by-case basis."

EPA is deferring action on Waterville Reservoir, pending implementation of a plan of study to better quantify water column dioxin concentrations. The study plan will involve at a minimum at least 5 high volume samples taken at a variety of locations (e.g., upstream of the Blue Ridge facility, in the Pigeon River, in Waterville Reservoir and at the NC/TN state line) as well as at least 2 sediment samples taken at a variety of locations (e.g., upstream of the Blue Ridge facility, in the Pigeon River, and in Waterville Reservoir). A draft plan of study is provided in Appendix E. DWQ has agreed to work with EPA as expeditiously as possible to complete this additional sampling effort in order to make final determination regarding impairment status of this water.

EPA is approving all other DWQ's listing decisions for fish consumption use support based on the methodology outlined in DWQ's Integrated Report. EPA does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. However, based on EPA's independent review, the provisions of the State's methodology related to age of data and minimum sample size did not result in DWQ failing to identify any waters based on fish consumption use.

6. Shellfish Consumption Use Support

The methodology for Shellfish Harvesting Use Support is applicable only to Class SA waters: tidal salt water bodies used for shellfish harvesting for market purposes.

Water Quality Standard	State Assessment Methodology
15A NCAC 02B .0221 Waters shall meet the current sanitary and bacteriological standards as adopted by the	An assessment unit was assessed as Impaired when the geometric mean was greater than 14 colonies/100ml or greater than 10% of the

Commission for Health Services and shall be suitable for shellfish cultures...Quality standards applicable: (a) Floating solids; settleable solids; sludge deposits: none attributable to sewage, industrial or other wastes. (b) Sewage: None (c) Industrial Wastes or other wastes: none which are not effectively treated...in accordance with the requirements of the Division of Health Services. (d) Organisms of the coliform group: fecal coliform group not to exceed a median MF of 14/100 ml and not more than 10 percent of the samples shall exceed an MF count of 43/100 ml in those areas most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions.	samples were higher than 43 colonies/100ml. An assessment unit was assessed as Impaired when the DEH growing area classification was Prohibited or Conditionally approved. This is a Category 5 listing requiring a TMDL.

The North Carolina Division of Environmental Health (DEH) operates its monitoring program under guidelines outlined in the National Shellfish Sanitation Program's Guide for the Control of Molluscan Shellfish. When a condition or event occurs that impacts the open status of waters, DEH closes those waters to protect public health. According to the DEH website (http://www.deh.enr.state.nc.us/shellfish/shellfish.htm), conditionally approved "areas are generally open to shellfishing, but can be closed after a significant rainfall event due to the resultant runoff. The area will then remain closed until water sampling indicates a return to acceptable bacteria levels." By definition, conditionally approved areas do not meet the water quality criteria based on a sanitary survey involving detailed water quality assessments conducted under the national protocols. Consequently, EPA's guidance advises, and DWQ's listing methodology agrees, that all conditionally approved areas be listed on the 303(d) list.

EPA Conclusion

EPA agrees that North Carolina's listing methodology provides for DWQ to make listing decisions based on bacteriological data and shellfish harvesting classification information and in a manner consistent with the state's currently applicable water quality standards and EPA regulations.

EPA does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. However, based on EPA's independent review of the existing and readily available data, the provisions of the State's methodology related to age of data and minimum sample size did not result in DWQ failing to identify any waters not attaining shellfish use. Therefore, EPA is approving DWQ's listing decisions for shellfish use support based on that methodology.

7. Recreational Use Support

In addition to all Class C requirements, Primary Recreation Use Support (e.g., swimming, water-skiing, skin diving) is assessed for all Class B, SA and SB waters. Secondary Recreation Use Support (e.g., wading, boating) is assessed for all Class C, SC and WS waters. North Carolina bases its determination of use support on (1) fecal coliform bacteria water quality standard for fresh water and (2) the duration of swimming advisories issued by state and local health departments.

The water quality standard for fecal coliform is applicable to all Class C, SC and Class B, SA and SB waters, as follows.

Water Quality Standard	**State Assessment Methodology**
15A NCAC 2B .0211 (3)(e) (Class C) **15A NCAC 2B .0219 (3)(b) (Class B)** 15A NCAC .0220 (3)(e) Class SC Fresh Waters Organisms of the coliform group: fecal coliforms shall not exceed (1) a geometric mean of 200/100 ml. (MF count) based upon at least five consecutive samples examined during any 30 day period, nor exceed (2) 400/100 ml. in more than 20 percent of the samples examined during such period. Coastal Waters Enterococcus, including *Enterococcus faecalis, Enterococcus faecium, Enterococcus avium* and *Enterococcus gallinarium*: not to exceed a geometric mean of 35 enterococci per 100 ml based upon a minimum of five samples within any consecutive 30 days.	**Recreation Use Support** Fresh Waters Supporting: neither part of the standard (#1 and 2, at left) is exceeded. Impaired: either part of the standard (#1 and 2, at left) is exceeded. Not Rated: insufficient fecal coliform bacteria data (less than 5 samples in 30 days). This is a Category 3a listing (instream data inconclusive). Coastal Waters Impaired: geometric mean greater than 35 colonies/100ml. At least 5 samples must have been collected within the same 30-day period. Not Rated: geometric mean was greater than 35 colonies/100ml and samples were not collected in the same 30-day period. This is a Category 3a listing (instream data inconclusive). **Advisory Posting Assessment**

	An AU was assessed as Impaired when a swimming advisory was posted for greater than 61 days in any 5 year period (includes permanent postings).

DWQ conducts monthly fecal coliform bacteria testing as part of its ambient monitoring program for fresh waters. The North Carolina Division of Environmental Health (DEH) tests coastal recreation waters for Enterococcus levels. According to North Carolina's 2006 Integrated Report and confirmed by recent discussions with DWQ staff, "Locations with annual geometric means greater than 200 colonies per 100 ml, or when more than 20 percent of the samples are greater than 400 colonies per 100 ml, are identified for potential follow-up monitoring conducted five times within 30 days as specified by the state fecal coliform bacteria standard. If bacteria concentrations exceed either portion of the state standard, the data are sent to DEH and the local county health director to determine the need for posting swimming advisories."

EPA Conclusion

Based on EPA's review of DWQ's assessment submittals, DWQ's assessment methodology for recreational use is consistent with North Carolina's existing, EPA-approved water quality standards.

EPA does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. However, based on EPA's independent review of the existing and readily available data, the provisions of the State's methodology related to age of data and minimum sample size did not result in DWQ failing to identify any waters not attaining recreational use. Therefore, EPA is approving DWQ's listing decisions for bacteria related to recreational use based on that methodology.

8. Drinking Water Use Support and Protection of Human Health

Water supply watersheds are classified as WS-I through WS-V waters. Water quality standards applicable to Class C waters also apply to Class WS-I through WS-V waters. The following WQSs apply to surface waters within water supply watersheds.

Water Quality Standard	**State Assessment Methodology**
NCAC 15A 02B .0212, .0214, .0215, .0216, .0218 Waters of this class are protected by numerous management strategies including significantly limiting the point and non-point sources and imposing development management practices. Chloride: 250 mg/l	An assessment unit was assessed as Impaired for water supply when greater than 10% of samples were greater than these standards. A minimum of 10 samples was needed to rate the water as Impaired. If the 10% criterion was exceeded and fewer than 10 samples were collected the assessment unit was not rated and targeted

Nickel: 25 ug/l Nitrate nitrogen: 10 mg/l Barium: 1.0 mg/l 2,4-D: 100 ug/l 2,4,5-TP (Silvex): 10 ug/l Sulfates: 250 mg/l	for further sampling.
Coliforms: total coliforms not to exceed 50/100ml (MF count) as a monthly geometric mean value in watersheds serving as unfiltered water supplies (in Class WS-I only) TDS: not greater than 500 mg/l Total hardness: not greater than 100 mg/l as calcium carbonate Phenolic compounds: not greater than 1.0 ug/l Beryllium: 6.8 ng/l Benzene: 1.19 ug/l Carbon Tetrachloride: 0.254 ug/l Chlorinated benzenes: 488 ug/l Dioxin: 0.000013 ng/l Hexachlorobutadiene: 0.445 ug/l Polynuclear aromatic hydrocarbons: 2.8 ng/l Tetrachloroethane: 0.172 ug/l Tetrachloroethylene: 0.8 ug/l Trichloroethylene: 3.08 ug/l Vinyl Chloride: 2 ug/l Aldrin: 0.127 ng/l Chlordane: 0.575 ng/l DDT: 0.588 ng/l Dieldrin: 0.135 ng/l Heptachlor: 0.208 ng/l	The Use Support Methodology does not discuss an assessment methodology for these parameters. According to the North Carolina Monitoring Program Strategy (2005), "There are currently a number of indicators with associated standards or action levels that are not monitored or infrequently monitored, particularly pesticides and other organics. This is primarily due to expense of analysis or current analytical methods have reporting limits above the applicable standard..."

All Toxics are Maximum Permissible Concentrations to protect human health through water consumption and fish tissue consumption for carcinogens and non-carcinogens.

EPA Conclusion

In previous list cycles, DWQ relied entirely upon the seven regional water treatment plants for making the assessment determination for public water supplies. EPA guidance stresses the importance of full assessment of public water supplies and so is pleased that beginning with the 2008 section 303(d) list cycle, DWQ began conducting its own assessment of water supplies.

DWQ's methodology to assess attainment of drinking water and human health uses for conventional pollutants is consistent with North Carolina's existing, EPA-approved water quality standards and with EPA regulations. EPA does not agree that provisions in the State's methodology related to age of data and minimum sample size are consistent with federal requirements. For the reasons set out in the section addressing assessment of section III.A.4.e above, EPA has not determined that use of the "> 10% exceedence" test is a reasonable method for DWQ to assess toxic or non-conventional pollutants

However, based on EPA's independent review of the existing and readily available data, the provisions of the State's methodology related to age of data, minimum sample size, and toxic or non-conventional pollutants did not result in DWQ failing to identify any waters not attaining drinking water and human health uses. EPA is, therefore, approving DWQ's listing decisions for drinking water and human health uses.

9. Other Pollution Control Requirements (40 CFR 130.7(b)(1))

EPA's regulations provide that TMDLs are not required for waterbodies where "[o]ther pollution control requirements (e.g., best management practices) required by local, State, or Federal authority are stringent enough to implement any water quality standards [WQS] applicable to such waters." 40 C.F.R. section 130.7(b)(1)(iii). EPA's *2006 Integrated Water Quality Monitoring and Assessment Report Guidance* acknowledges that the most effective method for achieving water quality standards for some water quality impaired segments may be through controls developed and implemented without TMDLs (referred to as a "4b alternative"). EPA expects that these controls must be specifically applicable to the particular water quality problem and be expected to result in standards attainment in the near future. EPA will evaluate on a case-by-case basis a state's decisions to exclude certain segment/pollutant combinations from Category 5 (the section 303(d) list) based on the 4b alternative. Monitoring should be scheduled for these assessment units to verify that the water quality standard is attained as expected.

There are no new Category 4b listings in North Carolina's 2010 section 303(d) list. For all waterbodies identified in Category 4b from previous list cycles, the State expects that other required regulatory controls (e.g., NPDES permit limits, Stormwater Program rules, Nutrient Management Rules, etc.) will result in meeting standards within a reasonable period of time. North Carolina has also confirmed that future monitoring will be used to verify standards achievement. EPA agrees with all of DWQ's listing decisions based on the applicability of other pollution control requirements.

B. North Carolina's 2010 Section 303(d) List of Impaired Waters (40 CFR 130.7(b)(4))

1. North Carolina's Addition of Water Quality Limited Segments

North Carolina identified additional water quality limited segments in its 2010 section 303(d) list submittal, consistent with section 303(d) and EPA's implementing regulations. EPA is approving the addition of those water quality limited segments to North Carolina's section 303(d) list. Newly listed waterbodies are given in Appendix B.

2. North Carolina's 2010 Removal of Waterbodies from 2008 Section 303(d) List (Delistings) (40 CFR 130.7(b)(6)(iv))

North Carolina proposed to remove specific water quality limited segments from its 2008 section 303(d) list, consistent with section 303(d) and EPA's implementing regulations. EPA has reviewed the good cause justification for those delisting requests and is approving the delisting of those water quality limited segments from North Carolina's section 303(d) list. The delisted waterbodies are identified in Appendix C.

C. Priority Ranking and Targeting (40 CFR 130.7(b)(4))

In previous Integrated Report submittals, DWQ provided a description of how water quality limited segments were prioritized for TMDL development. Prioritization was determined according to the severity of the impairment and the designated uses of the segment, taking into account the most serious water quality problems, most valuable and threatened resources, and risk to human health and aquatic life. According to EPA's *Final Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act; TMDL-01-03* dated July 21, 2003, "...States need not specifically identify each TMDL as high, medium or low priority. Instead, the schedule itself can reflect the State's priority ranking." The 2010 Integrated Report provides a Development Schedule (see below) as required but does not provide a description of the method used for prioritization. EPA recommends inclusion of North Carolina's method for prioritization of TMDL development in future lists.

D. Schedule for Development of TMDLs for Listed Waters and Pollutants

Pursuant to 40 CFR Section 130.7(b)(4), the state's submittal shall include "the identification of waters targeted for TMDL development in the next two years." The State's priority ranking shall take into account "the severity of the pollution and the uses to be made of such waters." 40 CFR Section 130.7(b)(4). The State has identified 11 waterbody-pollutant combinations that will be addressed over the next two years, as shown on page 146 of their Integrated Report submittal. EPA has determined that the State's priority ranking adequately considered the severity of pollution and the designated uses of such waterbodies, and that the State's schedule for TMDL development represents adequate progress.

IV. Final Recommendation on North Carolina's 2010 Section 303(d) List Submittal

After careful review of the final section 303(d) list submittal package, the Water Protection Division recommends that EPA Region 4 approve the State of North Carolina's 2010 section 303(d) list. EPA is deferring action on Waterville Reservoir, pending implementation of a plan of study to better determine water column dioxin concentrations. A draft plan of study is provided in Appendix E. DWQ has agreed to work with EPA as expeditiously as possible to complete this additional sampling effort in order to make final determination regarding impairment status of this water.

EPA's approval of North Carolina's section 303(d) list extends to all waterbodies on the list with the exception of those waters that are within Indian Country, as defined in 18 U.S.C. Section 1151. EPA is taking no action to approve or disapprove the State's list with respect to those waters at this time. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under section 303(d) for those waters.

Appendix A North Carolina 2010 Integrated Report Use Support Categories

IRC	IRC_desc
1	All designated uses are monitored and supporting
1b	Designated use was impaired other management strategy in place and no standards violations for the parameter of interest
1nc	DWQ have made field determination that parameter in exceedance is due to natural conditions.
1r	Assessed as supporting watershed is in restoration effort status
1t	No criteria exceeded but approved TMDL for parameter of interest
2	Some designated uses are monitored and supporting none are impaired Overall only
2b	Designated use was impaired other management strategy in place and no standards violations Overall only
2r	Assessed as supporting watershed is in restoration effort status overall only
2t	No criteria exceeded but approved TMDL for POI Overall only
3a	Inconclusive instream data
3b	Evaluation information no instream data available
3c	No data or information to make assessment
3n1	Chlorophyll a exceeds TL value and SAC is met-draft
3n2	Chlorophyll a exceeds EL value and SAC is not met first priority for further monitoring-draft
3n3	Chlorophyll a exceeds threshold value and SAC is not metfirst second priority for further monitoring-draft
3n4	Chlorophyll a not available determine need to collect-draft
3t	No data or information to make assessment but AU is in watershed where a TMDL/model is valid
4b	Designated use impaired other management strategy expected to address impairment
4c	Designated use impaired by something other than pollutant
4cr	Recreation use impaired no instream monitoring data or screening criteria exceeded
4cs	Shellfish harvesting impaired no instream monitoring data- no longer used
4ct	Designated use impaired but water is subject to approved TMDL or under TMDL development
4s	Impaired Aquatic Life with approved TMDL for Aquatic Life POI or category 5 listing
4t	Designated use impaired approved TMDL
5	Designated use impaired because of biological or ambient water quality standards violations and needing a TMDL.
5r	Assessed as impaired watershed is in restoration effort status

Appendix B North Carolina's Addition of Waterbodies to the 2010 Section 303(d) List

Assessment Unit	Waterbody Name	Basin	Reason for Listing	Parameter of Interest	Use Support Classification
9-(40.5)	BROAD RIVER	Broad	Std Vio	High Water Temperature	Aquatic Life
9-50-32-3	Sugar Branch	Broad	Std Vio	Low pH	Aquatic Life
16-(28.5)	HAW RIVER	Cape Fear	Std Vio	Turbidity	Aquatic Life
16-18-(1.5)a	Back Creek (Graham-Mebane Reservoir)	Cape Fear	Std Vio	Chlorophyll a	Aquatic Life
16-18-(1.5)b	Back Creek (Graham-Mebane Reservoir)	Cape Fear	Std Vio	Chlorophyll a	Aquatic Life
16-18-(1.5)b	Back Creek (Graham-Mebane Reservoir)	Cape Fear	Std Vio	Turbidity	Aquatic Life
16-20-(4)	Haw Creek	Cape Fear	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
16-27-(2.5)b	Cane Creek (Cane Creek Reservoir)	Cape Fear	Std Vio	Chlorophyll a	Aquatic Life
16-31-(2.5)	Terrells Creek (South Side Haw River)	Cape Fear	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
16-32	Terrells Creek (Ferrells Creek) (North Side Haw River)	Cape Fear	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
16-41-1-15-2-(1)*	Booker Creek (East-wood Lake)	Cape Fear	Std Vio	Low Dissolved Oxygen	Aquatic Life
16-41-2-(1)	Morgan Creek	Cape Fear	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
16-41-2-(1.5)	Morgan Creek (University Lake)	Cape Fear	Std Vio	Chlorophyll a	Aquatic Life
16-41-2-(5)	Morgan Creek	Cape Fear	Std Vio	NO2+NO3-N	Water Supply
16-6-(3)	Troublesome Creek	Cape Fear	Std Vio	Low Dissolved Oxygen	Aquatic Life
17-(4)a	DEEP RIVER	Cape Fear	Std Vio	Low Dissolved Oxygen	Aquatic Life
17-12a	Haskett Creek	Cape Fear	Std Vio	Low Dissolved Oxygen	Aquatic Life
17-43-(1)b	Rocky River	Cape Fear	Std Vio	Chlorophyll a	Aquatic Life

17-43-(5.5)a	Rocky River	Cape Fear	Std Vio	Chlorophyll a	Aquatic Life
17-43-(8)a	Rocky River	Cape Fear	Std Vio	Low Dissolved Oxygen	Aquatic Life
17-43-16b	Bear Creek	Cape Fear	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
17-8-2	Jenny Branch	Cape Fear	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
18-27-(3)b	Cross Creek (Big Cross Creek)	Cape Fear	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
18-68-17	Colly Creek	Cape Fear	Std Vio	Low pH	Aquatic Life
18-7-(11)	Buckhorn Creek (Harris Lake)	Cape Fear	Std Vio	Low Dissolved Oxygen	Aquatic Life
18-74-42	Lillington Creek	Cape Fear	Std Vio	Low pH	Aquatic Life
11-60	Falling Creek	Catawba	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
11-30	White Creek	Catawba	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
11-(114)	CATAWBA RIVER (Mountain Island Lake below elevation 648)	Catawba	Std Vio	Low pH	Aquatic Life
11-(123.5)b*	CATAWBA RIVER (Lake Wylie South FK Catawba Arm) North Carolina portion	Catawba	Std Vio	High Water Temperature	Aquatic Life
11-113-(2)	Johnson Creek	Catawba	Std Vio	Turbidity	Aquatic Life
11-119-(0.5)	Dutchmans Creek	Catawba	Std Vio	Turbidity	Aquatic Life
11-119-2-3	Forney Creek	Catawba	Fair Biocl.	Ecological/biological Integrity FishCom	Aquatic Life
11-119-3-(2)	Stanley Creek	Catawba	Std Vio	Low Dissolved Oxygen	Aquatic Life
11-129-(0.5)*	South Fork Catawba River	Catawba	Std Vio	Turbidity	Aquatic Life
11-129-(10.5)	South Fork Catawba River	Catawba	Std Vio	Turbidity	Aquatic Life
11-129-(14.5)	South Fork Catawba River	Catawba	Std Vio	Turbidity	Aquatic Life

11-129-(15.5)*	South Fork Catawba River	Catawba	Std Vio	Low pH	Aquatic Life
11-129-1-(12.5)b*	Henry Fork	Catawba	Std Vio	Turbidity	Aquatic Life
11-129-16-(4)	Long Creek	Catawba	Std Vio	Low pH	Aquatic Life
11-129-5-(9.5)*	Clark Creek	Catawba	Std Vio	Copper	Aquatic Life
11-129-8-(6.5)	Indian Creek	Catawba	Std Vio	Low pH	Aquatic Life
11-129-8-(6.5)	Indian Creek	Catawba	Std Vio	Turbidity	Aquatic Life
11-129-8-4-(1)	Mill Creek	Catawba	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
11-129-9-1-(2)	Little Beaverdam Creek	Catawba	Std Vio	Low pH	Aquatic Life
11-135-10-1	South Crowders Creek	Catawba	Std Vio	Low Dissolved Oxygen	Aquatic Life
11-137-1*	Irwin Creek	Catawba	Std Vio	Copper	Aquatic Life
11-137-1*	Irwin Creek	Catawba	Std Vio	Zinc	Aquatic Life
11-137-8a	Little Sugar Creek	Catawba	Std Vio	Copper	Aquatic Life
11-137-8a	Little Sugar Creek	Catawba	Std Vio	Turbidity	Aquatic Life
11-137-8a	Little Sugar Creek	Catawba	Std Vio	Water column Mercury	Fish Consumption
11-137-8b	Little Sugar Creek	Catawba	Std Vio	Copper	Aquatic Life
11-137-9-5	McMullen Creek	Catawba	Poor Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
11-137c	Sugar Creek	Catawba	Std Vio	Copper	Aquatic Life
11-33-(2)	Canoe Creek	Catawba	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
11-38-35	Parks Creek	Catawba	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
11-55-(1.5)	Gunpowder Creek (Old Mill Pond)	Catawba	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
11-69-4	Muddy Fork	Catawba	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
11-76-5-(0.7)	McLin Creek	Catawba	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life

7-2-59	Cane Creek	French Broad	Fair Biocl.	Ecological/biological Integrity FishCom	Aquatic Life
7-3-22	Bald Creek	French Broad	Std Vio	Fecal Coliform (recreation)	Recreation
5-16-(16)b	Richland Creek	French Broad	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
6-(47.5)ut23	UT FRENCH BROAD R	French Broad	Std Vio	Low Dissolved Oxygen	Aquatic Life
6-54-3-(17.5)	South Fork Mills River	French Broad	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
7-3-22-1	Fox Creek	French Broad	Std Vio	Fecal Coliform (recreation)	Recreation
7-3-22-4	Elk Wallow Creek	French Broad	Std Vio	Fecal Coliform (recreation)	Recreation
7-3-22-5	Lickskillet Branch	French Broad	Std Vio	Fecal Coliform (recreation)	Recreation
7-3-22-7	Possumtrot Creek	French Broad	Std Vio	Fecal Coliform (recreation)	Recreation
2-27-1	Iotla Branch	Little TN	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
2-79-39-5-1	Sugarloaf Creek	Little Tennessee	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
27-(22.5)a	NEUSE RIVER	Neuse	Std Vio	Turbidity	Aquatic Life
27-(22.5)c*	NEUSE RIVER	Neuse	Std Vio	PCB	Fish Consumption
27-(22.5)c*	NEUSE RIVER	Neuse	Std Vio	Turbidity	Aquatic Life
27-(49.5)a	NEUSE RIVER	Neuse	Std Vio	Turbidity	Aquatic Life
27-(5.5)a*	NEUSE RIVER (Falls Lake below normal pool elevation)	Neuse	Std Vio	Turbidity	Aquatic Life
27-112	Slocum Creek	Neuse	Std Vio	Chlorophyll a	Aquatic Life
27-125-(6)b	Dawson Creek	Neuse	Std Vio	Enterrococcus	Recreation
27-34-(1)	Walnut Creek	Neuse	Std Vio	PCB	Fish Consumption
27-34-(1.5)	Walnut Creek (Lake Johnson)	Neuse	Std Vio	PCB	Fish Consumption

27-34-(1.7)*	Walnut Creek	Neuse	Std Vio	PCB	Fish Consumption
27-34-(3.5)	Walnut Creek (Lake Raleigh)	Neuse	Std Vio	PCB	Fish Consumption
27-34-(4)a*	Walnut Creek	Neuse	Std Vio	PCB	Fish Consumption
27-34-(4)b*	Walnut Creek	Neuse	Std Vio	PCB	Fish Consumption
27-34-6a	Rocky Branch	Neuse	Std Vio	PCB	Fish Consumption
27-34-6b	Rocky Branch	Neuse	Std Vio	PCB	Fish Consumption
27-43-15-(1)a	Middle Creek	Neuse	Std Vio	Low Dissolved Oxygen	Aquatic Life
27-43-15-(4)a1	Middle Creek	Neuse	Std Vio	Turbidity	Aquatic Life
27-52-6a*	Hannah Creek	Neuse	Std Vio	Low pH	Aquatic Life
10-9-12	Crab Creek	New	Fair Biocl.	Ecological/biological Integrity FishCom	Aquatic Life
10-1-32b	Naked Creek	New	Fair Biocl.	Ecological/biological Integrity FishCom	Aquatic Life
30-1-6a	Coinjock Bay	Pasquotank	Std Vio	Enterrococcus	Recreation
30-21e1a	Roanoke Sound	Pasquotank	Loss of Use	Shellfish Growing Area-Prohibited	Shellfish Harvesting
30-5-(1)b	Little River	Pasquotank	Std Vio	Chlorophyll a	Aquatic Life
22-56-(3.5)a	Country Line Creek (Farmers Lake)	Roanoke	Std Vio	Chlorophyll a	Aquatic Life
22-56-(3.5)a	Country Line Creek (Farmers Lake)	Roanoke	Std Vio	Turbidity	Aquatic Life
28-(1)	TAR RIVER	Tar-Pamlico	Std Vio	Low Dissolved Oxygen	Aquatic Life
28-(36)b	TAR RIVER (including lower portion of the City of Rocky Mount Reservoir below highwater elevation 130 feet MSL)	Tar-Pamlico	Std Vio	Low Dissolved Oxygen	Aquatic Life
28-(64.5)	TAR RIVER	Tar-Pamlico	Std Vio	Low Dissolved Oxygen	Aquatic Life
28-11-2*	Foundry Branch	Tar-Pamlico	Std Vio	Low Dissolved Oxygen	Aquatic Life

28-11-2	Foundry Branch	Tar-Pamlico	Std Vio	Turbidity	Aquatic Life
28-29-(2)b	Cedar Creek	Tar-Pamlico	Std Vio	Turbidity	Aquatic Life
28-30a	Crooked Creek	Tar-Pamlico	Std Vio	Low Dissolved Oxygen	Aquatic Life
28-30b	Crooked Creek	Tar-Pamlico	Std Vio	Low Dissolved Oxygen	Aquatic Life
28-5a	North Fork Tar River	Tar-Pamlico	Fair Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
28-79-(1)	Fishing Creek	Tar-Pamlico	Std Vio	Low Dissolved Oxygen	Aquatic Life
28-79-30ut1	UT to Beech Swamp	Tar-Pamlico	Std Vio	Water column Mercury	Fish Consumption
28-79-30ut1	UT to Beech Swamp	Tar-Pamlico	Std Vio	Zinc	Aquatic Life
28-83ut8	UT to Town Creek	Tar-Pamlico	Severe Biocl.	Ecological/biological Integrity Benthos	Aquatic Life
29-3-3ut8	UT to Herring Run and ConnectCanals	Tar-Pamlico	Std Vio	Low Dissolved Oxygen	Aquatic Life
18-87-24	Wrightsville Recreational Area (including Lees Cut, MOtts Channel and portions of Banks Channel)	White Oak	Std Vio	Enterrococcus	Recreation
18-87-24-3b	Banks Channel area around RECMON station S22B	White Oak	Std Vio	Enterrococcus	Recreation
21-32*	Calico Creek	White Oak	Std Vio	High Water Temperature	Aquatic Life
12-(114)a*	YADKIN RIVER (including lower portion of High Rock Lake)	Yadkin	Std Vio	Turbidity	Aquatic Life
12-(124.5)d	YADKIN RIVER (including Tuckertown Lake, Badin Lake)	Yadkin	Std Vio	PCB	Fish Consumption
12-108-16-(0.5)b*	Hunting Creek	Yadkin	Std Vio	Low pH	Aquatic Life

12-108-18-(3)*	Bear Creek	Yadkin	Std Vio	Copper	Aquatic Life
12-119-(4.5)	Abbotts Creek (including Lexington-Thomasville Water Supply Reservoir at normal reservoir elevation, Tom-A-Lex Lake)	Yadkin	Std Vio	Chlorophyll a	Aquatic Life
12-94-(0.5)b*	Muddy Creek	Yadkin	Std Vio	Copper	Aquatic Life
12-94-(0.5)b*	Muddy Creek	Yadkin	Std Vio	Zinc	Aquatic Life
12-94-(0.5)c	Muddy Creek	Yadkin	Std Vio	Turbidity	Aquatic Life
13-(15.5)a	PEE DEE RIVER	Yadkin	Std Vio	Low Dissolved Oxygen	Aquatic Life
13-(15.5)a	PEE DEE RIVER	Yadkin	Std Vio	Low pH	Aquatic Life
13-17-20	Crooked Creek	Yadkin	Std Vio	Turbidity	Aquatic Life
13-17-40-(1)	Lanes Creek	Yadkin	Std Vio	Turbidity	Aquatic Life
13-17-9-(2)*	Irish Buffalo Creek	Yadkin	Std Vio	Turbidity	Aquatic Life
13-2-3-3-(0.7)	Back Creek (Back Creek Lake)	Yadkin	Std Vio	Chlorophyll a	Aquatic Life

* Waterbody already on the 303(d) list; this is a new impairment.

Appendix C
North Carolina's Removal of Waterbodies from the 2008 Section 303(d) List

Assessment Unit Number	Waterbody Name	Basin	Impair-ment*	Delist Reason (new Category)
16-11-(9)a2	Reedy Fork (Hardys Mill Pond)	CAPE FEAR	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
16-7b	Little Troublesome Creek	CAPE FEAR	EBIB	The assessment of new data documents that applicable water quality standards are being met for Benthos and fecal coliform (1)
17-12a	Haskett Creek	CAPE FEAR	EBIB	Pollutant causing impairment identified. TMDL implementation will result in attainment of water quality standards (4s)
17-2-(0.7)	East Fork Deep River	CAPE FEAR	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
17-2-(0.7)	East Fork Deep River	CAPE FEAR	REC FCB	TMDL completed and approved by EPA for fecal coliform bacteria (4t)
17-26-5-3c	Cotton Branch	CAPE FEAR	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
18-(71)a	Cape Fear River	CAPE FEAR	Nickel	Recategorize Category 5 Ni asmnt to 3a. Only 2 of 20 at B9795000 no other detections during asmnt period at 4 other nearby stations. (3a)
18-16-(0.7)b	Neills Creek	CAPE FEAR	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
18-16-(0.7)c1	Neills Creek	CAPE FEAR	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
18-74-(25.5)	Northeast Cape Fear River	CAPE FEAR	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
18-74-63	Smith Creek	CAPE FEAR	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
11-129-8-(6.5)	Indian Creek	CATAWBA	EBIB	The assessment of new data documents that applicable water quality standards are being met for Benthos (1)
11-129-8-(6.5)	Indian Creek	CATAWBA	EBIF	Pollutant causing impairment identified. TMDL implementation will result in attainment of water quality standards for Fish Community (4s)
11-135-4b	Abernethy Creek	CATAWBA	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)

11-135g	Crowders Creek	CATAWBA	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
11-35-3-(2)b	Irish Creek	CATAWBA	EBIF	The assessment of new data documents that applicable water quality standards are being met for fish community (1)
11-44-(3)	McGalliard Creek	CATAWBA	EBIB	The assessment of new data documents that applicable water quality standards are being met for Benthos (1)
25a1	Chowan River	CHOWAN	Low DO	Low pH and/or low DO standards violations due to natural conditions in the watershed. (3a)
5-16-(1)b	Richland Creek (Lake Junaluska)	FRENCH BROAD	EBIF	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed by EPA regulations (4c)
5-16-(11.5)a	Richland Creek (Lake Junaluska)	FRENCH BROAD	EBIF	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed by EPA regulations (4c)
5-16-(11.5)c	Richland Creek (Lake Junaluska)	FRENCH BROAD	EBIF	Documentation that the state included on a previous section 303(d) list an impaired segment that was not required to be listed by EPA regulations (4c)
5-16-(16)a	Richland Creek	FRENCH BROAD	EBIF	The assessment of new data documents that applicable water quality standards are being met for fish community (1)
5-32	Fines Creek	FRENCH BROAD	EBIF	The assessment of new data documents that applicable water quality standards are being met for fish community (1)
6-(54.5)b	FRENCH BROAD RIVER	FRENCH BROAD	REC FCB	The assessment of new data documents that applicable water quality standards are being met for fecal coliform bacteria (1r)
6-10b	Peter Weaver Creek	FRENCH BROAD	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
6-34-(15.5)	Davidson River	FRENCH BROAD	Low pH	Low pH and/or low DO standards violations due to natural conditions in the watershed. (3a)
6-76-5b	South Hominy Creek	FRENCH BROAD	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos and fish community (1)
2-190-(22)a	Cheoah River	LITTLE TN	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
27-43-(1)a	Swift Creek	NEUSE	EBIB	TMDL completed and approved by EPA for Impervious Cover (4t)
27-43-(1)b	Swift Creek	NEUSE	EBIB	TMDL completed and approved by EPA for Impervious Cover (4t)

27-43-2	Williams Creek	NEUSE	EBIB	TMDL completed and approved by EPA for Impervious Cover (4t)
10-1-3-(8)	East Fork South Fork New River	NEW	EBIB	The assessment of new data documents that applicable water quality standards are being met (1)
22-(31.5)a	DAN RIVER	ROANOKE	REC FCB	TMDL completed and approved by EPA for fecal coliform bacteria (4t)
22-(31.5)b	Dan River	ROANOKE	REC FCB	TMDL completed and approved by EPA for fecal coliform bacteria (4t)
22-(38.5)	Dan River	ROANOKE	REC FCB	TMDL completed and approved by EPA for fecal coliform bacteria (4t)
22-(39)a	Dan River	ROANOKE	REC FCB	TMDL completed and approved by EPA for fecal coliform bacteria (4t)
22-(39)b	Dan River	ROANOKE	REC FCB	TMDL completed and approved by EPA for fecal coliform bacteria (4t)
22-40-(1)	Smith River	ROANOKE	REC FCB	TMDL completed and approved by EPA for fecal coliform bacteria (4t)
22-40-(2.5)	Smith River	ROANOKE	REC FCB	TMDL completed and approved by EPA for fecal coliform bacteria (4t)
22-40-(3)	Smith River	ROANOKE	REC FCB	TMDL completed and approved by EPA for fecal coliform bacteria (4t)
28-101	Chicod Creek	TAR-PAMLICO	EBIB	The assessment of new data documents that applicable water quality standards are being met for fecal coliform bacteria and benthos (1)
28-83-3a	Cokey Swamp	TAR-PAMLICO	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
28-83-4	Bynums Mill Creek	TAR-PAMLICO	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
28-87-(0.5)a	Conetoe Creek	TAR-PAMLICO	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
28-87-(0.5)b	Conetoe Creek	TAR-PAMLICO	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
29-(5)b1	PAMLICO RIVER (Pamlico Segment)	TAR-PAMLICO	Chlor a	TMDL completed and approved by EPA for nutrients (4t)
29-(5)b2	PAMLICO RIVER (Pamlico Bath Segment)	TAR-PAMLICO	Chlor a	TMDL completed and approved by EPA for nutrients (4t)
29-(5)b3	PAMLICO RIVER (Pamlico Middle Segment)	TAR-PAMLICO	Chlor a	TMDL completed and approved by EPA for nutrients (4t)

12-108-21c	Second Creek (North Second Creek)	YADKIN-PEE DEE	EBIB	The assessment of new data documents that applicable water quality standards are being met for benthos (1)
12-119-7-4b	Hamby Creek	YADKIN-PEE DEE	EBIB	Pollutant causing impairment identified. TMDL implementation will result in attainment of water quality standards for benthos (4s)
13-17-40-(1)	Lanes Creek	YADKIN-PEE DEE	EBIB	Pollutant causing impairment identified. TMDL implementation will result in attainment of water quality standards for benthos (4s)

* Abbreviations:
EBIB:
Ecological/biological
Integrity Benthos
EBIF:
Ecological/biological
Integrity Fish Community
REC FCB:
Fecal Coliform (recreation)

APPENDIX D

ASSESSMENT UNITS WHERE FURTHER INVESTIGATION IS REQUIRED FOR POTENTIAL IMPAIRMENTS OF COPPER AND/OR ZINC

Assessment Unit Number	Waterbody Name	NC_Basin	Impairment	Review Notes
10b	New River (North Carolina Portion)	NEW	Copper	Benthos station KB34 colocated with K7900000 has had Excellent or Good bioclassifications since 1983. There are no identified sources of Copper or Zinc in the watershed upstream in Virginia -2008 NAIP. DWQ will pursue a natural conditions study for this
10b	New River (North Carolina Portion)	NEW	Zinc	Benthos station KB34 colocated with K7900000 has had Excellent or Good bioclassifications since 1983. There are no identified sources of Copper or Zinc in the watershed upstream in Virginia -2008 NAIP. DWQ will pursue a natural conditions study for this
12-(124.5)c	YADKIN RIVER (including Tuckertown Lake, Badin Lake)	YAD	Copper	Copper, chlorophyll a, and Turbidity exceedances not assessed in category 5 due to insufficient samples N<10.
12-108-21c	Second Creek (North Second Creek)	YAD	Copper	Benthos station QB504 colocated with Q4165000 has only been sampled once in 2008. There are no identified sources of Copper-2008 NAIP. DWQ will continue to monitor Copper to determine if the exceedances are regular and ongoing.
12-110b	Grants Creek	YAD	Copper	Copper or Zinc Assessment exceedances not assessed in category 5 due to insufficient samples N<10.
12-110b	Grants Creek	YAD	Zinc	Copper or Zinc Assessment exceedances not assessed in category 5 due to insufficient samples N<10.
13-17-40-(1)	Lanes Creek	YAD	Copper	Copper and Zinc exceedances not assessed in category 5 due to insufficient samples N<10.
13-17-40-(1)	Lanes Creek	YAD	Zinc	Copper and Zinc exceedances not assessed in category 5 due to insufficient samples N<10.
13-17-40-10	Barkers Branch	YAD	Copper	Copper exceedances not assessed in category 5 due to insufficient samples N<10.
13-2-3-3-(0.7)	Back Creek (Back Creek Lake)	YAD	Copper	Copper exceedances not assessed in category 5 due to insufficient samples N<10.

13-45-(1)	Marks Creek (Water Lake)	YAD	Copper	Chorophyll *a* and Copper exceedances not assessed in category 5 due to insufficient samples N<10.
16-(1)d2	HAW RIVER	CPF	Zinc	Zinc exceedances not assessed in category 5 due to insufficient samples N<10.
17-(4)b	DEEP RIVER	CPF	Zinc	Combined data are below 20% exceedance for fecal coliform
17-(4)b	DEEP RIVER	CPF	Zinc	Zinc exceedances not assessed in category 5 due to insufficient samples N<10.
22-58-12-6b	Marlowe Creek	ROA	Copper	Zinc and Copper exceedances not assessed in category 5 due to insufficient samples N<10.
22-58-12-6b	Marlowe Creek	ROA	Zinc	Zinc and Copper exceedances not assessed in category 5 due to insufficient samples N<10.
27-(118)a2	NEUSE RIVER Estuary	NEU	Copper	Copper exceeds by exactly 10% at nearby J9930000. J9810000 is a mid channel station with no nearby sources. Not 95% confident in 10% exceedance of standard. DWQ will continue to monitor.
27-(49.5)a	NEUSE RIVER	NEU	Copper	Benthos stationJB34 colocated with J5250000 has had Good bioclassifications since 1995. Do not have 95% confidence in Copper exceedance of standard. There are no identified sources of Copper in the watershed. DWQ will pursue a natural conditions study for this
27-(96)b2	NEUSE RIVER Estuary	NEU	Copper	J8900800 is a mid channel station with no nearby sources. DWQ will continue to monitor stations in immediate upstream freshwater do not exceed criteria.
27-23-(2)	Smith Creek	NEU	Zinc	Zinc exceedances not assessed in category 5 due to insufficient samples N<10.
27-33-(10)c	Crabtree Creek	NEU	Copper	Copper exceedances not assessed in category 5 due to insufficient samples N<10.
28-11e	Fishing Creek	TAR	Zinc	Do not have 95% confidence in Copper and Zinc Exceedances. Colocated Benthos at OB10 has remained stable or improved since 1990. Colocated fish community at OF17 has improved since 1992 and is currently Excellent.
28-11e	Fishing Creek	TAR	Copper	Do not have 95% confidence in Copper and Zinc Exceedances. Colocated Benthos at OB10 has remained stable or improved since 1990. Colocated fish community at OF17 has improved since 1992 and is currently Excellent.
29-6-(5)	Chocowinity Bay	TAR	Copper	O7710000 is a mid-channel station with no nearby sources. Immediate upstream freshwater stations do not exceed criteria DWQ will continue to monitor

APPENDIX E

DRAFT Plan of Study for High Volume Sampling of Dioxin in Waterville Reservoir and Pigeon River

Description of Issue

In August, 2010, the EPA, Region 4 Water Protection Division (WPD) requested assistance from the EPA, Region 4 Science and Ecosystem Support Division (SESD) to evaluate the concentrations of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) that may be present in Waterville Reservoir, Haywood County, North Carolina. This study is being performed in support of the North Carolina Division of Water Quality's (NCDWQ's) efforts to fully assess the impairment status of Waterville Reservoir with respect to dioxin. The project is tentatively scheduled for Fall 2010/Summer 2011.

Based on calculations conducted by EPA WPD using fish tissue data collected from 1990-2008, concentrations of 2,3,7,8-TCDD may be present in the water column above NC's water quality standard (WQS) of 0.005 parts per quadrillion (ppq). Traditional sampling and analytical techniques are not capable of reporting 2,3,7,8-TCDD at very low concentrations. The primary objective of this study is to quantify current 2,3,7,8-TCDD levels in the water column of Waterville Reservoir in order to verify use support assessment (human health effects due to fish consumption).

Background

Blue Ridge Paper Products (BRPP), a facility upstream of Waterville Reservoir in Canton, NC, is a fully integrated pulp and paper mill that produces both bleached and unbleached pulp and paper using the kraft process. During past operations, 2,3,7,8-TCDD was contained within wastewaters as a result of the kraft process. The kraft process was changed in the early 1990's to eliminate discharge of 2,3,7,8-TCDD in BRPP wastewater. As required by their NPDES permit, BRPP collects fish tissue samples for 2,3,7,8-TCDD analysis.

NCDWQ's assessment methodology for dioxin is based on fish consumption advisories. NC has listed the Pigeon River and Waterville Reservoir in the past based on fish advisories. Once BRPP stopped releasing detectable levels of 2,3,7,8-TCDD in the early 1990s, levels in fish tissue (monitored annually) have been declining in the Pigeon River and Waterville Reservoir. When the last fish advisory was dropped in 2007, these waterbodies were removed from NC's 303(d) list. However, the level of dioxin in fish tissue which triggers a fish tissue advisory in NC is less stringent than the level that would indicate the water is not attaining the WQS for dioxin. EPA WPD's review of the BRPP NPDES permit renewal in 2009 led to review of recent fish tissue data. Back calculations of these data indicate that the water column levels in the Reservoir are elevated above the State's WQS for dioxin.

NCDWQ believes that it is likely that the 2,3,7,8-TCDD levels found in fish tissue are due primarily to sediment contamination. EPA is deferring action on placing Waterville Reservoir on the 303(d) list, pending implementation of this plan of study to further verify water column 2,3,7,8-TCDD concentrations.

Primary objective

The primary objective of this study is to quantify the amount of 2,3,7,8-TCDD present in Waterville Reservoir and the Pigeon River and to determine whether the concentration is above NC's WQS of 0.005 ppq. To do this, high volume sampling, a technique developed by SESD, will be employed. High volume sampling can achieve a much lower detection limit, allowing direct comparison of the water column monitoring data with the state water column WQS. Water column sampling will be conducted on the Pigeon River above and below the BRPP facility, in the Reservoir, as well as at the NC/TN line. Sediment sampling will be conducted in the Reservoir and at one reference site (above the BRPP facility). Final sample site locations will be established after consultation with NCDWQ.

Study Approach

The study approach will involve deployment of field crews using SESD vessels to collect water and sediment samples. Additional land-based support team would be established for sample management and shipping.

A high-volume (Infiltrex™ 300) trace organic sampler will be used to collect the water column samples for PCDD and PCDF analyses. The Infiltrex™ 300 sampler is designed to remove particulate and dissolved fractions of organic constituents *in situ* by passing a high volume of water through a one micrometer glass fiber filter (for the particulate phase) and two columns packed with adsorptive (XAD-2) resin (for the dissolved phase). The particulate and dissolved fractions will be analyzed separately for PCDD and PCDF using a modified version of EPA Method 1613: Tetra- Through Octa – Chlorinated Dioxins and Furans By Isotope Dilution HRGC/HRMS (Revision B). A contract lab will be used for all 2,3,7,8-TCDD analyses.

In addition to the samples collected with the Infiltrex™ 300 samplers, grab samples for total suspended solids (TSS) and measurements for pH, specific conductance, dissolved oxygen, temperature, depth and turbidity will be collected during the sampling period. This data will provide information regarding the variability of these parameters within the sampling stream during sample collection and will be used to assist with the assessment of the dioxin data.