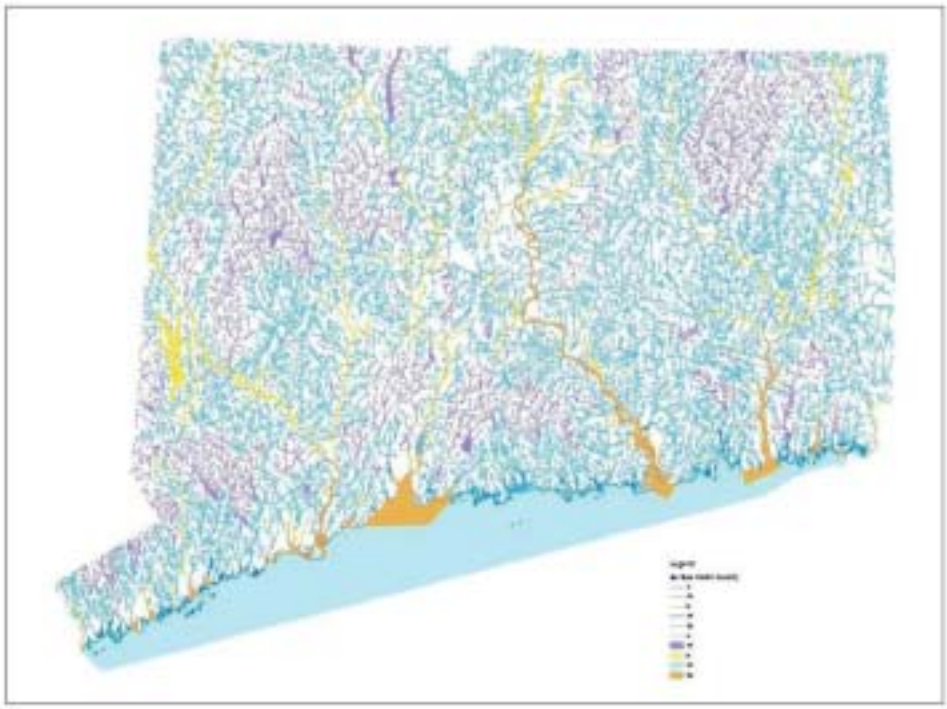
STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATER QUALITY STANDARDS



Bureau of Water Protection and Land Reuse
Planning and Standards Division

Surface Water Quality Standards	**Effective**	**February 25, 2011**
Groundwater Quality Standards	**Effective**	**April 12, 1996**

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CONNECTICUT WATER QUALITY STANDARDS

PREFACE

The Water Quality Standards (WQS) set forth in this publication are an important element in Connecticut's clean water program. The WQS set an overall policy for management of water quality in accordance with the directive of Section 22a-426 of the Connecticut General Statutes. In simple terms the policies can be summarized by saying that the Department of Environmental Protection shall:

- Protect surface and ground waters from degradation.
- Segregate waters used for drinking from those that play a role in waste assimilation.
- Restore surface waters that have been used for waste assimilation to conditions suitable for fishing and swimming.
- Restore degraded ground water to protect existing and designated uses.
- Provide a framework for establishing priorities for pollution abatement and State funding for clean up.
- Adopt standards that promote the State's economy in harmony with the environment.

There are three elements that make up the WQS. The first of these is the Standards themselves. The Standards comprise the policy statements that discuss issues such as: classification of different water resources according to the desirable use; antidegradation; allowable types of discharges; fundamental principles of waste assimilation; and a variety of other subjects. The second element, also contained in this document, is the Criteria. The Criteria are descriptive and numerical standards that describe the allowable parameters and goals for the various water quality classifications. The final element is the Classification Maps that show the Class assigned to each surface and groundwater resource throughout the State. These maps identify the relationship between designated uses and the applicable Standards and Criteria for each class of surface and ground water.

These three elements, Standards, Criteria and Classification Maps, comprise the WQS and are adopted using the public participation procedures contained in Section 22a-426 of the Connecticut General Statutes. The Standards, Criteria and Classification Maps are required to be reviewed and revised on a triennial basis. Any change is considered a revision requiring public participation. The public participation process consists of public meetings, notification of all chief elected officials, notice in the Connecticut Law Journal and a public hearing. The Classification Maps may be the subject of separate public hearings that are held for the adoption of the map covering each major drainage basin in the State.

As with any complex program, it is always difficult to anticipate the questions that the public may have about either proposed or adopted standards. The staff of the Planning and Standards Division of the Bureau of Water Protection and Land Reuse are the best source of information about these WQS and are always willing to provide answers to your questions. They may be contacted by writing to:

Director
Planning and Standards Division
Bureau of Water Protection and Land Reuse
Department of Environmental Protection
79 Elm Street
Hartford, Connecticut 06106-5127

The WQS do not stand alone; rather, they are one critical element in Connecticut's program to protect and improve water quality. The WQS are written in response to, and in concert with, the principles of Connecticut's Clean Water Act, which is in Chapter 446k of the Connecticut General Statutes (CGS). The Statutes set the broad outline and legal framework for Connecticut's entire program. They establish the authorities and procedures for the WQS, for permitting discharges to the waters of the State and for the abatement of pollution. Within the framework of the Statutes, the WQS establish broad policy and objectives to meet the statutory goals. These objectives are then carried out by means of specific procedures and requirements of statutory sections and even more detailed regulations. These include Statutes and Regulations for the permitting of discharges to the waters of the State, hazardous materials management, solid waste management, water diversions, structures, dredging, wetlands and others.

The Water Quality Standards provide policy guidance in many different areas, all of which are subject to detailed statutory and regulatory requirements. Some examples are as follows:

- Decisions on the acceptability of a type of discharge to a specific water resource.
- Any decision on the siting of a landfill.
- Decisions on the type of remediation and priority for the cleanup of hazardous waste sites.
- Decisions on the priority assigned to improvements of municipal sewerage systems and the priority for funding such projects.
- Decisions on Water Quality Certification pursuant to Section 401 of the Federal Clean Water Act.

INTRODUCTION

Section 22a-426 of the Connecticut General Statutes requires that the Commissioner of Environmental Protection adopt standards of water quality consistent with the federal Clean Water Act. The WQS establish a goal of restoring and maintaining the chemical, physical, and biological integrity of Connecticut surface waters and, wherever attainable, providing for the protection and propagation of fish, shellfish, and wildlife and for recreation in and on the water. The purpose of these WQS is to provide clear and objective statements for existing and projected water quality and the general program to improve Connecticut's water resources. They also serve to qualify the State and its municipalities for available federal grants for water pollution control. Section 22a-426 of the Connecticut General Statutes mandates these WQS shall:

- Apply to interstate waters or portions thereof within the State.
- Apply to such other waters within the State as the Commissioner may determine is necessary.
- Protect the public health and welfare and promote the economic development of the State.
- Preserve and enhance the quality of State waters for present and prospective future use for public water supplies, propagation of fish and aquatic life and wildlife, recreational purposes and agricultural, industrial and other legitimate uses.
- Be consistent with the health standards as established by the Department of Public Health.

Water Quality Classifications, based on the adopted WQS, establish designated uses for surface and ground waters and identify the criteria necessary to support those uses. The designated use and criteria applicable to each water body or identified segment serve to focus the Department's water quality management activities, including establishment of water quality based treatment controls and strategies required by the federal Clean Water Act.

Section 303 of the federal Clean Water Act requires state adoption of surface WQS and their review and, if warranted, modification at least once every three years. Connecticut first adopted Water Quality Standards in 1967. Federal law defines WQS as the identification of water quality goals for each water resource through the assignment of designated uses to be made of the water and by setting criteria necessary to protect the uses.

Federal regulations specify that WQS should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water, taking into consideration their use and value for public water supplies, propagation of fish, shellfish and wildlife, recreation in and on the water and agricultural, industrial and other purposes including navigation.

Although federal law requires adoption of Water Quality Standards for surface waters, WQS for ground waters are not subject to federal review and approval. Connecticut's WQS recognize that surface and ground waters are interrelated and address the issue of competing use of ground waters for drinking and for wastewater assimilation. These Standards specifically identify ground water quality goals, designated uses and those measures necessary for protection of public and private drinking water supplies, which are the principal uses of Connecticut ground waters.

SURFACE WATER QUALITY STANDARDS

1. It is the State's goal to restore or maintain the chemical, physical, and biological integrity of surface waters. Where attainable, the level of water quality that provides for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water shall be achieved.

2. Existing and designated uses such as propagation of fish, shellfish and wildlife, recreation, public water supply, and agriculture, industrial use and navigation, and the water quality necessary for their protection is to be maintained and protected.

3. Surface waters with an existing quality better than the criteria established in these WQS shall be maintained at their existing high quality, unless the Commissioner finds, after adequate opportunity for intergovernmental review and public participation, that allowing lower water quality is necessary to accommodate overriding economic or social benefits to the State and to the area in which the surface water is located, and that existing and designated uses will be fully protected. The implementation procedures for the antidegradation provisions of these WQS are provided in full in Appendix E.

4. For all new and existing discharges to high quality surface waters the Commissioner shall, at a minimum, require applicants to meet the highest applicable standards of performance promulgated pursuant to the Federal Clean Water Act and the Connecticut General Statutes, and may require additional treatment measures if deemed necessary to prevent pollution and maintain high water quality. The Commissioner shall also require the use of appropriate Best Management Practices for control of discharges and activities to high quality surface waters.

5. If the Commissioner designates a high quality surface water as an Outstanding National Resource Water pursuant to federal regulations at 40 CFR 131.12(a) the high water quality shall be maintained and protected. The lowering of water quality is prohibited for such surface waters except where activities limited in time and scope will result in only temporary and insignificant changes in water quality and the activities will not result in water quality less than necessary to protect existing and designated uses.

6. Standard 1 shall be met except where (1) a use attainability analysis prepared pursuant to federal regulation at 40 CFR 131.10(g) and (j) demonstrates that the surface water has been irreparably altered to the extent that certain designated uses have been permanently lost; and (2) quality criteria necessary to protect all other existing, and designated uses of the surface water have been adopted by the Commissioner as a revision to these WQS in accordance with Section 22a-426 of the Connecticut General Statutes. Periodic re-examination of such designated use decisions shall be performed as required by federal regulations (40 CFR 131.20).

7. Any person or municipality requesting a change in Water Quality Classification shall demonstrate to the Commissioner that the proposed new Classification is consistent with all existing or designated uses made of, or presently possible in, such surface waters. Any such change in a Water Quality Classification shall be considered a revision of these WQS and subject to the public participation requirements of Section 22a-426 of the Connecticut General Statutes. The Commissioner will not approve a reclassification which is not consistent with Standards 3 or 4 of these WQS.

8. Water Quality Criteria do not apply to environmental conditions brought about by natural causes or conditions.

9. Discharges to surface waters shall be limited as follows:

   (A) Class AA, A and SA surface waters: discharges may be permitted by the Commissioner from public or private drinking water treatment systems, dredging activity and dredge material dewatering operations, including the discharge of dredged or fill material and clean water discharges. In Class AA surface waters such discharges shall be subject to the approval of the Commissioner of Public Health. The Commissioner may authorize other discharges to surface waters with a Classification of SA, A or AA provided the Commissioner finds such discharge will be of short duration and is necessary to remediate surface water or ground water pollution. Any such discharge shall be treated or controlled to a level which in the judgment of the Commissioner, protects aquatic life and public health.

   The Commissioner may authorize certain treated domestic sewage discharges to surface waters with a Classification of A or SA provided the Commissioner finds that: 1) such discharge is deemed necessary by the Commissioner to abate ground water or surface water pollution from a domestic sewage disposal system that was in use prior to February 28, 2011; 2) such discharge is treated or controlled to the maximum extent practicable in the subsurface and in all cases to a level that in the judgment of the Commissioner, in consultation with the Commissioner of Public Health, protects the environment, public health, safety and welfare; 3) such discharge does not constitute a community pollution problem as defined in Section 22a-423 of the Connecticut General Statutes; 4) a demonstration has been made to the satisfaction of the Commissioner that no technically and economically feasible alternative exists for such discharge; and 5) such discharge is not being sought in connection with a new source, new or expanded building or development, or a change to the design or use of an existing building or development, which change results in, or as designed may result in, an increase in (i) the occupancy of such building or development or (ii) the discharge from such building or development. Nothing in this standard shall preclude the Commissioner from requiring such discharge to be eliminated should future conditions provide a technically or economically feasible alternative to authorizing such discharge.

   (B) Class B and SB surface waters: discharges may be permitted for all those allowed in Class AA, A and SA surface waters, cooling water discharges, discharges from municipal and industrial wastewater treatment systems and other discharges subject to the provisions of Section 22a-430 of the Connecticut General Statutes.

(C) Class B* surface waters: discharges may be permitted for all those allowed in Class AA, A and SA surface waters. No direct wastewater discharges are allowed other than those consistent with Class AA, A and SA surface waters.

10. The Commissioner may, on a case-by-case basis, establish zones of influence when authorizing discharges to surface waters under Sections 22a-430 and 22a-133(k) of the Connecticut General Statutes in order to allocate a portion of the receiving surface waters for mixing and assimilation of the discharge. Unless otherwise indicated in these WQS, the applicable Water Quality Criteria apply outside the zone of influence for a discharge. Establishment of a zone of influence shall not preclude attainment of any existing or designated uses of the receiving surface waters. The area and/or volume of receiving water allocated to zones of influence shall be determined based on the unique physical, chemical and biological characteristics of the receiving surface water body. The Commissioner may require applicants to provide information on receiving surface water and wastewater characteristics including the volume of flow and area required for mixing and assimilation of waste. The zone of influence shall be limited to the maximum extent possible. As a guideline, the zone of influence for assimilation of a thermal discharge shall be no greater than 25% of the cross-sectional area or volume of flow of the receiving water. In establishing a zone of influence the Commissioner shall consider without limitation:

(A) the characteristics of the discharge, such as its volume, strength, temperature and the persistence of any substances in the discharge, potential bioaccumulation or bioconcentration of these substances in aquatic organisms, and the potential for any substances, either singly or in combination with other substances present in the discharge or receiving surface water body to result in an unacceptable risk to human health or the environment.

(B) an allowance for a continuous zone of passage for free swimming and drifting organisms.

(C) the effect of the discharge on spawning grounds or nursery areas of sensitive aquatic organisms or areas utilized by aquatic organisms for shelter and living space.

(D) the effect of the discharge on the aesthetic quality of the receiving water including but not limited to the potential to cause objectionable deposits, floating debris, oil, scum, and other materials that form nuisances or produce objectionable color, odor, taste, or turbidity, or that may attract undesirable aquatic life or wildlife, or result in the dominance of nuisance species.

(E) the location of other discharges in the receiving surface water body to insure that the cumulative effect of adjacent zones of influence will not significantly reduce the environmental value or preclude any existing or designated uses of the receiving surface water.

Assessment of environmental value will be based on the characteristics of the receiving surface water including but not limited to: type of water body, velocity, depth, number and type of aquatic habitats, migration patterns, nature of the food chain, level of productivity, water temperature, condition of associated biological communities, ability of tributaries to provide biological recruitment, presence of endangered species and value

to human uses (aesthetic, commercial, sport fishing and recreational uses).

11. The 7Q10 is the minimum flow to which these Water Quality Standards for surface waters apply, except when a surface water is regulated by dams or water withdrawals sanctioned by law to result in flows below that level. In such cases these Water Quality Standards apply to that low flow determined by the Department's Minimum Flow Regulations as amended (Section 26-141a-1, et seq. of the Regulations of Connecticut State Agencies); the Department's Diversion Permit Program (Section 22a-365 through 22a-378 of the Regulations of Connecticut State Agencies); or the Federal Energy Regulatory Commission's hydropower licensing process (Federal Power Act 16 USCS SEC 791a et seq). Maintaining a long-term flow of 7Q10 or less may result in significant stress on the physical and biological quality of surface waters. In those surface waters at, near or below the naturally occurring 7Q10 flow, more stringent Water Quality Criteria may be required to achieve and maintain existing and designated uses. The Commissioner may approve discharge limitations based on minimum average daily flow in excess of 7Q10 conditions, provided the Commissioner is satisfied that special measures will be implemented during low flow conditions which provide protection to the environment at least as effective as that protection which would pertain if limitations were based solely on 7Q10 conditions. Surface waters which are influenced by tidal forces or which experience short-term variation in flow due to periodic or irregular water release from upstream diversions or other causes may require special consideration by the Commissioner when establishing a zone of influence or issuing discharge permits under the provisions of Section 22a-430 of the Connecticut General Statutes in order to protect existing and designated uses, including consideration of the minimum flow to which these Water Quality Standards apply. Low flow in a tidal water body shall be evaluated under low tide conditions unless another low flow regime is demonstrated to the Commissioner's satisfaction to be protective of water quality and aquatic resources.

12. The Commissioner, pursuant to Chapter 446k of the Connecticut General Statutes and regulations adopted there under, will regulate discharges to the surface waters to assure that such discharges do not cause acute or chronic toxicity to freshwater and marine aquatic life and wildlife, do not impair the biological integrity of freshwater and marine ecosystems and do not create an unacceptable risk to human health.

    (A) In making a determination under Chapter 446k of the Connecticut General Statutes as to whether a discharge will or can reasonably be expected to cause pollution of surface waters, the Commissioner shall consider the numeric criteria for the chemical constituents listed in Appendix D;

    (B) The Commissioner may amend the numeric criteria for the chemical constituents listed in Appendix D of these WQS in accordance with the procedures specified in Section 22a-426 of the Connecticut General Statutes on his or her own initiative, or upon request of any person or municipality that site-specific water quality criteria be adopted or amended, provided such request is supported by sound scientific and technical evidence demonstrating the following:

        1. Conditions at the specific site differ significantly from those used in establishing the statewide criteria.

        2. The proposed site-specific criteria are sufficiently stringent to protect all existing and designated uses of the water body.

3. The proposed site-specific criteria are derived in a manner consistent with sound scientific and technical principles, giving consideration to all applicable federal guidance.

13. The Commissioner may adopt or amend criteria for any surface water or class of water, in accordance with the procedures specified in the Connecticut General Statutes (Section 22a-426) and in paragraphs (1), (2), and (3) of Standard 12(B) of these WQS, provided such change is supported by sound scientific and technical evidence, and existing and designated uses are fully protected.

14. Surface waters and sediments shall be free from chemical constituents in concentrations or combinations which will or can reasonably be expected to result in acute or chronic toxicity to aquatic organisms or otherwise impair the biological integrity of aquatic or marine ecosystems outside of any dredged material disposal area or areas designated by the Commissioner for disposal or placement of fill materials or any zone of influence allowed by the Commissioner, or bioconcentrate or bioaccumulate in tissues of fish, shellfish and other aquatic organisms at levels which will impair the health of aquatic organisms or wildlife or result in unacceptable tastes, odors or health risks to human consumers of aquatic organisms or wildlife unless such sediments are capped with material suitable for unconfined, open water disposal as an appropriate means of ensuring consistency with this standard as approved by the Commissioner in writing. In determining consistency with this Standard, the Commissioner shall at a minimum consider the numeric criteria listed in Appendix D and any other information the Commissioner deems relevant.

15. Except within dredged material disposal areas or areas designated by the Commissioner for disposal or placement of fill materials, surface waters and bottom sediments shall be substantially free of pollutants that: a) unduly affect the composition of bottom fauna; b) unduly affect the physical or chemical nature of the bottom; or c) interfere with the propagation or habitats of shellfish, finfish and wildlife. Dredged materials disposed of at a dredged material disposal area shall not result in: a) floating residues of any sort; b) release of any substance which may result in long-term or permanent degradation of water quality in surface waters overlying or adjacent to the disposal areas; c) dispersal of contaminated sediments outside a dredged material disposal area other than that occurring as a transient plume during disposal operations; or d) biological mobilization and subsequent transport of toxic substances to food chains. The Commissioner may consider Best Management Practices including but not limited to capping the dredged material with material suitable for unconfined open water disposal as appropriate means of ensuring consistency with this standard.

16. Biological Condition criteria may be utilized where appropriate for assessment of the biological integrity of surface waters.

17. The discharge of radioactive materials to a surface water in concentrations or combinations which would be harmful to human, animal or aquatic life shall not be allowed. The applicable criteria can be found in Title 10, Part 20 of the Code of Federal Regulations.

18. Best Management Practices for control of non-point source pollutants may be required by the Commissioner on a case-by-case basis.

19. The Commissioner shall require Best Management Practices, including imposition of discharge limitations or other reasonable controls on a case-by-case basis as necessary for point and nonpoint sources of phosphorus and nitrogen, including sources of atmospheric deposition, which have the potential to contribute to the impairment of any surface water, to ensure maintenance and attainment of existing and designated uses, restore impaired waters, and prevent excessive anthropogenic inputs of nutrients or impairment of downstream waters.

20. Use of Best Management Practices and other reasonable controls on nonpoint sources of nutrients and sediment are preferable to the use of biocides to address a trophic state that has been altered due to excessive anthropogenic inputs.

21. Surface waters identified as potential drinking water supplies in the Long Range Plan for Management of Water Resources prepared and adopted pursuant to Section 22a-352 of the Connecticut General Statutes shall be designated Class AA. The Commissioner may, with the concurrence of the Commissioner of the Department of Public Health, designate other surface waters as Class AA including surface waters that (1) have been designated a proposed drinking water supply in Connecticut's Conservation and Development Policies Plan, (2) have been recommended for future use as a drinking water supply in the current approved water supply plan submitted and approved pursuant to Section 25-32d of the Connecticut General Statutes, (3) the Commissioner has issued a Diversion Permit authorizing use as a drinking water supply, or (4) have been identified in a request from a municipality for designation as a drinking water supply at a public hearing concerning water quality classifications.

22. Section 22a-417 of the Connecticut General Statutes imposes an absolute restriction on the discharge of sewage to Class AA reservoirs and their tributaries. The existence of a discharge to a surface water which occurs outside the State that then flows into the State shall not be considered a valid reason for either relaxing the restriction in Connecticut or changing the Class AA designation. It is a policy of the State to pursue the adoption of compatible WQS in neighboring states to assure the protection of Connecticut drinking water supplies.

23. Disinfection shall be required for all treated sewage discharges to surface waters. The period of disinfection shall vary depending on the characteristics of the receiving surface water as described below:

    (A) Continuous disinfection shall be required at all sewage treatment plants located south of Interstate Highway 95 (I-95) to protect shellfish resources.

    (B) Disinfection shall be required from May 1 to October 1 at all sewage treatment plants located north of I-95. Seasonal disinfection is intended to protect the sanitary quality of bathing waters, and minimize adverse impacts to aquatic life associated with disinfection. An alternative schedule, including continuous disinfection, may be required if found necessary by the Commissioner to protect existing or designated uses.

    (C) For those Class B surface waters located north of Interstate Highway 95 (I-95) and downstream of a sewage treatment plant providing seasonal disinfection as

authorized by the Commissioner, criteria for indicator bacteria do not apply during periods when disinfection is not required.

24. The discharge of sewage from any vessel to any water is prohibited.

25. Indicator bacteria are used to detect the potential presence of contamination by human or animal wastes. Due to the inherent uncertainty involved in sampling and analytically determining bacteria levels, exceedences of water quality criteria does not always indicate a water quality problem and therefore should be investigated by means of a sanitary survey or other appropriate means to determine sources of elevated indicator bacteria levels. (see also Appendix B).

26. Physical obstructions such as dams, which prevent fish migration for spawning and growth, shall not be considered a valid reason for failure to achieve and maintain water quality conditions necessary to support all designated uses of a surface water unless the Commissioner has approved a Use Attainability Analysis documenting that a designated use is not attainable for such surface water.

27. The allowable temperature increase resulting from discharges in the estuarine segments of the Housatonic, Connecticut and Thames Rivers shall be consistent with the criteria for the non-tidal segments.

28. Surface water quality monitoring methods shall be consistent with Title 40 Part 30 of the Code of Federal Regulations or other equivalent monitoring methods approved in writing by the Commissioner.

29. Surface waters which are not specifically classified shall be considered as Class A or Class SA.

30. Watercourses which are contained in drainage conduits or pipes and which are not assigned a specific class are considered to be the class of the water body segment into which they discharge.

31. Revisions to the WQS, including but not limited to the following, shall be subject to the public participation process provided for in Section 22a-426 of the Connecticut General Statutes:

    (A) The adoption of a map which depicts the Water Quality Classifications assigned to any water resource.

    (B) Any decisions regarding the lowering of water quality in existing high quality surface waters or a change in the Water Quality Classification of any surface water.

    (C) The adoption of any Use Attainability Analysis.

    (D) The adoption or amendment of site-specific water quality criteria.

32. These WQS shall apply to all surface waters. Evaluation of a discharge or discharge of dredged or fill material to wetlands shall include consideration of the manner in which

such wetlands support existing and designated uses and protect and maintain downstream water quality.

SURFACE WATER CLASSIFICATIONS AND CRITERIA

CLASS AA DESIGNATED USES AND CRITERIA

Designated Uses- These surface waters are designated for: existing or proposed drinking water supplies; habitat for fish and other aquatic life and wildlife; recreation; and water supply for industry and agriculture.

Parameter	Criteria
Aesthetics	Uniformly excellent.
Dissolved oxygen	Not less than 5 mg/L at any time.
Sludge deposits-solid refuse-floating solids-oils and grease-scum	None other than of natural origin.
Color	None other than of natural origin.
Suspended and settleable solids	None in concentrations or combinations which would impair designated uses; none aesthetically objectionable; none which would significantly alter the physical or chemical composition of the bottom; none which would adversely impact aquatic organisms living in or on the bottom substrate.
Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredging activity or discharge of dredged or fill materials provided all reasonable controls or Best Management Practices are used in such activities and all designated uses are protected and maintained.
Turbidity	Shall not exceed 5 NTU over ambient levels and none exceeding levels necessary to protect and maintain all designated uses. All reasonable controls or Best Management Practices are to be used to control turbidity.
Indicator bacteria	See Appendix B.
Taste and odor	None other than of natural origin.
pH	As naturally occurs.
Allowable Temperature Increase	There shall be no changes from natural conditions that would impair any existing or designated uses assigned to this Class and in no case exceed 85 ^{o}F, or in any case raise the temperature of surface water more than 4 ^{o}F.
Chemical constituents	None in concentrations or combinations which would be harmful to designated uses. Refer to Standards numbers 10, 11, 12, 13, 14, 17 and 19.
Nutrients	The loading of nutrients, principally phosphorus and nitrogen, to any surface water body shall not exceed that which supports maintenance or attainment of designated uses.
Sodium	Not to exceed 20 mg/L.
Biological Condition	Sustainable, diverse biological communities of indigenous taxa shall be present. Moderate changes, from natural conditions, in the structure of the biological communities, and minimal changes in ecosystem function may be

evident; however, water quality shall be sufficient to sustain a biological condition within the range of Connecticut Biological Condition Gradient Tiers 1-4 as assessed along a 6 tier stressor gradient of Biological Condition Gradient (See Appendix G).

CLASS A DESIGNATED USES AND CRITERIA

Designated Uses - These surface waters are designated for: habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; navigation; and water supply for industry and agriculture.

Parameter	Criteria
Aesthetics	Uniformly excellent.
Dissolved oxygen	Not less than 5 mg/L at any time.
Sludge deposits-solid refuse-floating solids-oils and grease-scum	None other than of natural origin.
Color	None other than of natural origin.
Suspended and settleable solids	None in concentrations or combinations which would impair designated uses; none aesthetically objectionable; none which would significantly alter the physical or chemical composition of the bottom; none which would adversely impact aquatic organisms living in or on the bottom substrate.
Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, dredging activity or the discharge of dredged or fill materials provided all reasonable controls or Best Management Practices are used in such activities and all designated uses are protected and maintained.
Turbidity	Shall not exceed 5 NTU over ambient levels and none exceeding levels necessary to protect and maintain all designated uses. All reasonable controls or Best Management Practices are to be used to control turbidity.
Indicator bacteria	See Appendix B.
Taste and odor	None other than of natural origin.
pH	As naturally occurs.
Allowable Temperature Increase	There shall be no changes from natural conditions that would impair any existing or designated uses assigned to this Class and, in no case exceed 85 ^{o}F, or in any case raise the temperature of surface water more than 4 ^{o}F.
Chemical constituents	None in concentrations or combinations which would be harmful to designated uses. Refer to Standards numbers 10, 11, 12, 13, 14, 17, and 19.
Nutrients	The loading of nutrients, principally phosphorus and nitrogen, to any surface water body shall not exceed that which supports maintenance or attainment of designated uses.
Sodium	None other than of natural origin.
Biological Condition	Sustainable, diverse biological communities of indigenous taxa shall be present. Moderate changes, from natural conditions, in the structure of the biological communities, and minimal changes in ecosystem function may be evident; however, water quality shall be sufficient to sustain a biological condition within the range of Connecticut Biological Condition Gradient Tiers 1-4 as assessed along a 6 tier stressor gradient of Biological Condition Gradient (See Appendix G).

CLASS B DESIGNATED USES AND CRITERIA

Designated Uses - These surface waters are designated for: habitat for fish and other aquatic life and wildlife; recreation; navigation; and industrial and agricultural water supply.

Parameter	Criteria
Aesthetics	Good to excellent.
Dissolved oxygen	Not less than 5 mg/L at any time.
Sludge deposits-solid refuse floating solids-oils and grease-scum	None except for small amounts that may result from the discharge from a permitted waste treatment facility and none exceeding levels necessary to protect and maintain all designated uses.
Color	None which causes visible discoloration of the surface water outside of any designated zone of influence.
Suspended and settleable solids	None in concentrations or combinations which would impair the most sensitive designated use; none aesthetically objectionable; none which would significantly alter the physical or chemical composition of the bottom; and none which would adversely impact aquatic organisms living in or on the bottom sediments; shall not exceed 10 mg/L over ambient concentrations.
Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, dredging activity or discharge of dredged or fill materials provided all reasonable controls or Best Management Practices are used in such activities and all designated uses are protected and maintained.
Turbidity	Shall not exceed 5 NTU over ambient levels and none exceeding levels necessary to protect and maintain all designated uses. All reasonable controls or Best Management Practices are to be used to control turbidity.
Indicator bacteria	Refer to Appendix B
Taste and odor	None that would impair any uses specifically assigned to this Class.
pH	6.5 – 8.0
Allowable Temperature Increase	There shall be no changes from natural conditions that would impair any existing or designated uses assigned to this Class and, in no case exceed 85 ^{o}F, or in any case raise the temperature of surface water more than 4 ^{o}F.
Chemical constituents	None in concentrations or combinations which would be harmful to designated uses. Refer to Standards numbers 10, 11, 12, 13, 14, 17, and 19.
Nutrients	The loading of nutrients, principally phosphorus and nitrogen, to any surface water body shall not exceed that which supports maintenance or attainment of designated uses.

Biological Condition	Sustainable, diverse biological communities of indigenous taxa shall be present. Moderate changes, from natural conditions, in the structure of the biological communities, and minimal changes in ecosystem function may be evident; however, water quality shall be sufficient to sustain a biological condition within the range of Connecticut Biological Condition Gradient Tiers 1-4 as assessed along a 6 tier stressor gradient of Biological Condition Gradient (See Appendix G).

Note: Class B* surface water, applicable to Candlewood Lake, is a subset of Class B waters and is identical in all ways to the designated uses, criteria and standards for Class B waters except for the restriction on direct discharges stated in Water Quality Standard 9.

CLASS SA DESIGNATED USES AND CRITERIA

Designated Uses - These surface waters are designated for: habitat for marine fish, other aquatic life and wildlife; shellfish harvesting for direct human consumption; recreation; industrial water supply; and navigation.

Parameter	Criteria
Aesthetics	Uniformly excellent.
Dissolved oxygen	Acute: Not less than 3.0 mg/L. Chronic: Not less than 4.8 mg/L with cumulative periods of dissolved oxygen in the 3.0– 4.8 mg/L range as detailed in Appendix C.
Sludge deposits-solid refuse-floating solids-oils and grease-scum	None other than of natural origin.
Color	None other than of natural origin.
Suspended and settleable solids	None other than of natural origin.
Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, dredging activity or the discharge of dredged or fill materials provided all reasonable controls or Best Management Practices are used in such activities and all designated uses are protected and maintained.
Turbidity	None other than of natural origin except as may result from normal agricultural, road maintenance, or construction activity, dredging activity or discharge of dredged or fill materials provided all reasonable controls and Best Management Practices are used to control turbidity and none exceeding levels necessary to protect and maintain all designated uses.
Indicator bacteria	See Appendix B
Taste and odor	As naturally occurs.
pH	6.8 – 8.5
Allowable Temperature Increase	There shall be no changes from natural conditions that would impair any existing or designated uses assigned to this Class and, in no case exceed 83 ^{o}F, or in any case raise the temperature of the receiving water more than 4 ^{o}F. During the period including July, August and September, the temperature of the receiving water shall not be raised more than 1.5 ^{o}F unless it can be shown that spawning and growth of indigenous organism will not be significantly affected.
Chemical constituents	None in concentrations or combinations which would be harmful to designated uses. Refer to Standards numbers 10, 11, 12, 13, 14, 17, and 19.

Nutrients	The loading of nutrients, principally phosphorus and nitrogen, to any surface water body shall not exceed that which supports maintenance or attainment of designated uses.
Biological Condition	Sustainable, diverse biological communities of indigenous taxa shall be present. Moderate changes, from natural conditions, in the structure of the biological communities, and minimal changes in ecosystem function may be evident; however, water quality shall be sufficient to sustain a healthy, diverse biological community

CLASS SB DESIGNATED USES AND CRITERIA

Designated Uses - These waters are designated for: habitat for marine fish, other aquatic life and wildlife; commercial shellfish harvesting; recreation; industrial water supply; and navigation.

Parameter	Criteria
Aesthetics	Good to excellent.
Dissolved oxygen	Acute: Not less than 3.0 mg/L. Chronic: Not less than 4.8 mg/L with cumulative periods of dissolved oxygen in the 3.0– 4.8 mg/L range as detailed in Appendix C.
Sludge deposits-solid refuse-floating solids-oils and grease-scum	None except for small amounts that may result from the discharge from a grease waste treatment facility providing appropriate treatment and none exceeding levels necessary to protect and maintain all designated uses.
Color	None resulting in obvious discoloration of the surface water outside of any designated zone of influence.
Suspended and settleable solids	None in concentrations or combinations which would impair the designated uses; none aesthetically objectionable; none which would significantly alter the physical or chemical composition of bottom sediments; none which would adversely impact organisms living in or on the bottom sediment.
Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, dredging activity or discharge of dredged or fill materials provided all reasonable controls or Best Management Practices are used in such activities and all designated uses are protected and maintained.
Turbidity	None other than of natural origin except as may result from normal agricultural, road maintenance, or construction activity, or discharge from a waste treatment facility providing appropriate treatment, dredging activity or discharge of dredged or fill materials provided all reasonable controls and Best Management Practices are used to control turbidity and none exceeding levels necessary to protect and maintain all designated uses.
Indicator bacteria	See Appendix B.
Taste and odor	As naturally occurs. None that would impair any uses specifically assigned to this Class.
pH	6.8 – 8.5
Allowable Temperature Increase	There shall be no changes from natural conditions that would impair any existing or designated uses assigned to this Class and, in no case exceed 83 ^{o}F, or in any case raise the temperature of the receiving water more than 4°F. During the period including July, August and September, the temperature of the receiving water shall not be raised more than 1.5 ^{o}F unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected.
Chemical constituents	None in concentrations or combinations which would be harmful to designated uses. Refer to Standards numbers 10, 11, 12, 13, 14, 17, and 19.

Nutrients	The loading of nutrients, principally phosphorus and nitrogen, to any surface water body shall not exceed that which supports maintenance or attainment of designated uses
Biological Condition	Sustainable, diverse biological communities of indigenous taxa shall be present. Moderate changes, from natural conditions, in the structure of the biological communities, and minimal changes in ecosystem function may be evident; however, water quality shall be sufficient to sustain a healthy, diverse biological community

LAKE TROPHIC CATEGORIES

The ranges of Total Phosphorus, Total Nitrogen, Chlorophyll-a, and Secchi Disk Transparency appearing in Table 1 below are assessed collectively to determine the trophic state of a lake. In addition to water column data, the trophic state of a lake is determined by the percentage of the surface area covered by macrophytes in accordance with Table 2 below. For the purpose of determining consistency with the WQS, the natural trophic state of a lake is compared with the current trophic state to determine if the trophic state of the lake has been altered due to excessive anthropogenic inputs. Lakes in advanced trophic states which exceed their natural trophic state due to anthropogenic sources are considered to be inconsistent with WQS.

Table 1: Parameters and Defining Ranges for Trophic State of Lakes in Connecticut			
Trophic State Based on Water Column Data	**Description**	**Parameters**	**Defining Range**
Oligotrophic	May be Class AA, Class A, or Class B water. Low in plant nutrients. Low biological productivity characterized by the absence of macrophyte beds. High potential for water contact recreation.	Total Phosphorus	0-10 ug/l spring and summer
		Total Nitrogen	0-200 ug/l spring and summer
		Chlorophyll-a	0-2 ug/l mid-summer
		Secchi Disk Transparency	6 + meters mid-summer
Mesotrophic	May be Class AA, Class A, or Class B water. Moderately enriched with plant nutrients. Moderate biological productivity characterized by intermittent blooms of algae and/or small areas of macrophyte beds. Good potential for water contact recreation.	Total Phosphorus	10-30 ug/l spring and summer
		Total Nitrogen	200-600 ug/l spring and summer
		Chlorophyll-a	2-15 ug/l mid-summer
		Secchi Disk Transparency	2-6 meters mid-summer
Eutrophic	May be Class AA, Class A, or Class B water. Highly enriched with plant nutrients. High biological productivity characterized by occasional blooms of algae and/or extensive areas of dense macrophyte beds. Water contact recreation opportunities may be limited.	Total Phosphorus	30-50 ug/l spring and summer
		Total Nitrogen	600-1000 ug/l spring and summer
		Chlorophyll-a	15-30- ug/l mid-summer
		Secchi Disk Transparency	1-2 meters mid-summer
Highly Eutrophic	May be Class AA, Class A, or Class B water. Excessive enrichment with plant nutrients. High biological productivity, characterized by severe blooms of algae and/or extensive areas of dense macrophyte beds. Water contact recreation may be extremely limited.	Total Phosphorus	50 + ug/l spring and summer
		Total Nitrogen	1000 + ug/l spring and summer
		Chlorophyll-a	30 + ug/L mid-summer
		Secchi Disk Transparency	0-1 meters mid-summer

AQUATIC MACROPHYTES

Macrophytes are aquatic plants large enough to be seen without magnification. Macrophyte distribution and abundance data are reviewed in conjunction with the water column data to determine the trophic states of lakes or ponds. If macrophyte growth is very extensive (75 - 100% of water body area) and dense, the trophic state of a lake or pond is "highly eutrophic" regardless of the water column data. If macrophyte growth is extensive (30 - 75% of water body area) and dense, the trophic state is "mesotrophic" when the water column indication is oligotrophic, and the trophic state is "eutrophic" when the water column indication is mesotrophic or eutrophic.

Table 2 Percent of Macrophyte Coverage Used to Determine Trophic State of Lakes

Trophic State Based on Water Column Data	% Water Body Area of Lake Affected by Macrophytes	Lake Trophic State
Oligotrophic	<30	Oligotrophic
	30-75	Mesotrophic
	>75	Highly Eutrophic
Mesotrophic	<30	Mesotrophic
	30-75	Eutrophic
	>75	Highly Eutrophic
Eutrophic	<30	Eutrophic
	30-75	Eutrophic
	>75	Highly Eutrophic

GROUND WATER QUALITY STANDARDS

GW1. The policy of the Department in areas that are classified as GAA, GAA, or GA is to maintain or restore all ground water in such areas to its natural quality.

GW2. If the Commissioner determines that, with respect to a particular pollutant, restoring or maintaining natural quality at a GAA, GAAs, or GA level is not technically practicable, the Department's policy is to:

(A) maintain or restore quality such that the ground water is suitable for drinking and other domestic uses without treatment, and

(B) maintain or restore quality such that the ground water will not adversely affect surface water quality or prevent the maintenance or attainment of any designated uses of surface waters to which that ground water discharges, and

(C) eliminate sources of pollution to such ground water to the extent that the Commissioner determines to be technically practicable, and regulate discharges to such groundwater so as to prevent pollution.

GW3. Ground water is deemed suitable for drinking and other domestic uses without treatment when no pollutant in such groundwater:

(A) exceeds a level which the Commissioner of Public Health has determined, pursuant to Section 22a-471 of the General Statues, creates or reasonably can be expected to create an unacceptable risk of injury to the health or safety of persons using such ground water for drinking or other personal or domestic use,

(B) is a carcinogen present at a concentration associated with a l-x-10^{-6} excess cancer risk,

(C) is a non-carcinogen present at a level exceeding that to which the human population, including sensitive subgroups, can be exposed on a daily basis without appreciable risk of adverse health effects during a lifetime, or

(D) exceeds a level which the Commissioner determines, in consultation with the Commissioner of Public Health, renders the ground water so aesthetically impaired that a person cannot reasonably be expected to consume or otherwise use it.

GW4. The policy of the Department in areas classified as GB is:

(A) to eliminate or reduce in the ground water any pollutant which presents a hazard of fire, explosion, or toxic or hazardous emission to the environment or otherwise poses a threat to public safety or an unacceptable risk to public health, and

(B) to maintain the ground water at a quality that will not adversely affect the quality of surface waters to which such ground water discharges or

prevent the maintenance or attainment of any designated or existing uses in such surface waters, and

(C) to maintain a quality consistent with all designated and existing uses of the ground water, including its use for drinking without treatment if such ground water has, prior to the adoption of these WQS, been utilized for, and continues to be utilized, for drinking water, and

(D) to regulate discharges to the ground water in order to prevent further degradation of ground water quality.

GW5. The policy of the Department in areas classified as GC is:

(A) to eliminate or reduce in the ground water any pollutant which presents a hazard of fire, explosion, or toxic or hazardous emission to the air or otherwise poses a threat to public safety or an unacceptable threat to public health, and

(B) to maintain the ground water at a quality that will not adversely affect the quality of surface waters to which such ground water discharges or prevent the maintenance or attainment of any designated or existing uses in such surface waters, and

(C) to limit the impacts of waste discharges on ground water quality to those which, despite the use of treatment technology, cannot be avoided and which result from a discharge which is authorized by a permit under Section 22a-430 of the General Statutes.

GW6. With respect to ground water whose quality is actually higher than that reflected by the assigned classification, the Department's policy is that such ground water should be maintained at its existing high quality. To maintain such quality, the Commissioner may require that:

(A) a new, increased, or otherwise modified discharge to such ground water shall be given treatment such that, notwithstanding such classification, the actual higher quality is maintained.

(B) if after the adoption of these WQS there is an unpermitted release of pollutants to ground water which is classified GB but whose quality is actually GA or GAA, such groundwater shall be remediated to the standards for Class GA or GAA.

GW7. The Commissioner may raise the ground water classification of any area if he finds that such ground water meets the standards for the higher classification.

GW8 (A) The Commissioner may consider an application to lower a ground water Classification to GB. Such application shall be subject to the public participation requirements of Section 22a-426 of the General Statutes and shall:

(i) describe the nature and extent and date of commencement of pollution of the ground water proposed to be reclassified,

(ii) identify all sources of drinking water in the area whose ground water is proposed to be reclassified and identify all existing uses of ground water within and down gradient of such area,

(iii) assess the potential of the subject area to produce ground water in an amount suitable for a public water supply,

(iv) describe all past and present land uses in the subject area with dates, and

(v) provide such other information the Commissioner may reasonably require to determine the most appropriate ground water classification.

(B) A ground water classification shall not be lowered to GB unless the applicant has satisfactorily demonstrated that; any person within or down gradient of the area to be reclassified and extending to an area previously classified as GB or to a surface water body to which the groundwater discharges will be provided with an adequate public water supply, and that lowering of a ground water classification will not prevent attainment of adjacent surface water quality goals or present unacceptable health risks, and

(i) that the ground water to be reclassified is polluted as a result of intense urban, commercial, or industrial development which occurred prior to 1981, and the hydrologic conditions of the subject area are not suitable for the development of a significant public water supply, or

(ii) the ground water proposed to be reclassified is polluted and remediation of such ground water to a quality suitable for drinking without treatment is not technically practicable, or

(iii) there is an overriding social or economic justification for reclassifying the ground water to GB and the proposed reclassification is supported by the affected municipality or municipalities, as affirmed, in writing, by the chief executive officer(s) of the municipality or municipalities. For the purpose of this Standard an “affected municipality” is one in which ground water classifications are to be altered, “social justification” means a specific social need of the affected municipality or the state and “economic justification” means avoidance of an economic impact that would substantially impair or otherwise detrimentally affect the economy of the community or the state. The applicant must also demonstrate that the purposes for the reclassification will not result in development that is inconsistent with the State Policies Plan for Conservation and Development as adopted pursuant to Section 16a-30 of the General Statutes.

GW9. The Commissioner may consider an application to lower a ground water classification to GC. Any such application shall be subject to the public participation requirements of Section 22a-426 of the General Statutes and:

(A) Such application shall be accompanied by a completed application under Section 22a-430 of the General Statutes for a permit to discharge leachate from a solid waste land disposal facility to the subject ground water.

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(B) A ground water classification shall not be lowered to GC unless the applicant has satisfactorily demonstrated that:

(i) there is an overriding social or economic justification for reclassifying the ground water to GC and the affected municipality or municipalities have been notified of the proposed reclassification; and

(ii) the ground water proposed to be reclassified is not suitable for development of a significant public water supply and is suitable for waste treatment; and

(iii) the subject area is adjacent to and hydraulically connected with a surface water body classified B or SB; and

(iv) in a Section 22a-430 permit application the applicant has delineated the zone of influence (see standard GW10) of the ground water proposed to be reclassified as extending from the proposed solid waste land disposal facility to the receiving surface water body, and the applicant owns the land overlying such zone of influence, or has an easement with respect to such land which easement is properly recorded and provides protections, as described in subsection D(l) and D(2) of Standard GWI0, or otherwise controls the zone of influence to the satisfaction of the Commissioner.

GW10. Zones of influence. The Commissioner may establish zones of influence when, in the course of permitting discharges to the ground water under Section 22a-430 of the General Statutes, he allocates ground water and soil resources for the treatment of pollutants. Within that zone of influence the Section 22a-430 permittee will be allowed to degrade the ground water such that it may not meet the standards for the assigned classification or be suitable for uses designated by these Water Quality Standards for such classification.

(A) For a subsurface sewage disposal system permitted under authority delegated pursuant to Section 22a 430- 1 of the Regulations of Connecticut State Agencies to the Commissioner of Health and Addiction Services, the zone of influence shall be that area required by the minimum separating distances established in Section 19- 13-B 103d of the Regulations of Connecticut State Agencies.

(B) For discharges to ground water of treated domestic sewage other than discharges of domestic sewage identified in subparagraph GW1O(A),

agricultural wastes, and storm water, the zone of influence shall be the area in which such discharge causes the ground water to be 1) altered in quality from its natural condition, or 2) lowered in quality from that which is suitable for drinking and other domestic uses without treatment. The Commissioner may require the applicant for a permit under Section 22a-430 of the General Statutes to submit for the Commissioner's approval an engineering plan showing the areal extent of any such zone of influence.

(C) The applicant for a permit under Section 22a-430 of the General Statutes authorizing a discharge other than a discharge of treated domestic sewage, agricultural waste, or storm water shall delineate the zone of influence associated with the proposed discharge. Such zone of influence shall include all areas beneath which the ground water which is or may be affected in quality by such discharge. The Commissioner may require that such zone of influence extend to a receiving water body with a classification of B or SB.

(D) The Commissioner may require the applicant for a permit under Section 22a-430 of the General Statutes to demonstrate that he has acquired rights to the zone of influence of the proposed discharge. Acquisition of such rights means that the applicant owns the land overlying such zone, has obtained an easement with respect to such land and has recorded such easement in the applicable Town Clerk's office, or otherwise controls such zone to the Commissioner's satisfaction. Any such easement or G other control mechanism shall: 1) provide the applicant with the exclusive right to use the ground water in such zone and such right to enter the land overlying such zone as the Commissioner deems necessary to accommodate monitoring or remediation, and 2) assure that the ground water within such zone will not be used for potable water supply.

(E) The delineation by a Section 22a-430 permit applicant of the zone of influence of a proposed waste discharge indicates that the underlying ground water may not be suitable for human consumption or other uses. Installation of a withdrawal well in or near such a zone of influence may result in an induced flow of polluted ground water to such well. When reviewing an application to withdraw groundwater pursuant to Connecticut's Water Diversion Policy Act, General Statutes Sections 22a-365 et seq., the Commissioner considers the potential impacts on water quality attributable to induced flow of polluted water from a zone of influence associated with a waste discharge.

GW11. The Department's classification of ground water, whether as GB, GC, or otherwise, conveys no right to degrade that ground water or to utilize less effective treatment measures than those utilized for discharges to groundwater designated for use as potable water. Domestic sewage shall be given the same treatment regardless of the classification of the groundwater to which such sewage is discharged.

GW12. The Commissioner applies the following policies in reviewing applications under Section 22a-430 of the General Statutes to discharge waste to ground water:

(A) Class GAA Ground Waters: The Commissioner does not issue permits authorizing a discharge to class GAA ground water unless such discharge is of treated domestic sewage as defined in Section 22a-430-1 of the Regulations of Connecticut State Agencies, waste generated by certain agricultural practices, certain water treatment waste waters from public water supply treatment systems, or certain minor cooling waters or clean waters. If a GAA area is within an Aquifer Protection Area designated in accordance with Section 22a-354 of the General Statutes, the Commissioner does not issue permits authorizing a groundwater discharge that conflicts with anyregulation adopted pursuant to Section 22a-354(i) of the General Statutes

(B) Class GAAs Ground Waters: The Commissioner does not issue permits authorizing a discharge to class GAA ground water unless such discharge is of treated domestic sewage as defined in Section 22a-430-1 of the Regulations of Connecticut State Agencies, waste generated by certain agricultural practices, certain water treatment waste waters from public water supply treatment systems, or certain minor cooling waters or clean waters. If a GAAs area is within an Aquifer Protection Area designated in accordance with Section 22a-354 of the General Statutes, the Commissioner does not issue permits authorizing a groundwater discharge that conflicts with any regulation adopted pursuant to Section 22a 354(i) of the General Statutes.

(C) Class GA Ground Waters: The Commissioner does not issue permits authorizing a discharge to class GA ground water unless such discharge is allowed under subparagraph (A) of this standard or is a Discharge from a septage treatment system or of other wastes that are predominantly human, plant, or animal in origin so long as any such wastes are of natural origin, easily biodegradable and, if properly managed, pose no threat of pollution to the ground water. The ground water plume generated by a discharge of septage treatment system must terminate in a stream with classification of B or SB unless the permittee treats the discharge in a manner which the Commissioner determines is adequate to maintain class A water in the receiving stream.

(D) Class GB Ground Waters: The Commissioner may issue permits authorizing a waste discharge to class GB ground water if such discharge would be allowable in a GA area under subparagraph (C) of this standard or if such discharge meets all of the following criteria:

(i) the Commissioner has determined that such waste is generated by a source which is unlikely to produce persistent pollutants or pollutants that do not biodegrade in soil.

(ii) the waste will be treated as necessary to render it amenable to attenuation by the receiving soil so that the groundwater will not be impaired.

(iii) such discharge otherwise conforms with all applicable legal requirements and standards.

(E) Class GC Ground Waters: The Commissioner may issue permits authorizing a discharge to class GC ground water of any material, provided such discharge otherwise conforms with all applicable legal requirements and standards.

GW13. The Commissioner may issue a permit authorizing a discharge of material to ground water, even if such discharge would be inconsistent with subparagraph (A), (B), (C), or (D) of Standard GW12, provided such discharge otherwise conforms with all applicable legal requirements and standards, is necessary to remediate groundwater pollution, and is treated or managed such that, to the maximum extent practicable, the discharge does not impair public health or the environment.

GROUND WATER CLASSIFICATIONS AND CRITERIA

CLASS GAA DESIGNATED USES AND CRITERIA

Designated Uses: Existing or potential public supply of water suitable for drinking without treatment; baseflow for hydraulically-connected surface water bodies.

GAA Criteria

Parameter	Criterion
1. Dissolved Oxygen	As naturally occurs.
2. Oils and grease	None other than of natural origin.
3. Color and turbidity	None other than of natural origin.
4. Coliform bacteria	None other than of natural origin.
5. Taste and odor	None other than of natural origin.
6. pH	As naturally occurs.
7. Chemical constituents	As naturally occurs.

Sub-Classifications of Class GAA

GAA — Ground water used or which may be used for public supplies of water suitable for drinking without treatment; ground water in the area that contributes to a public drinking water supply well; and ground water in areas that have been designated as a future water supply in an individual water utility supply plan or in the Area wide Supplement prepared by a Water Utility Coordinating Committee pursuant to Title 25 of the General Statutes.

GAA_S — Ground water that is tributary to a public water supply reservoir.

CLASS GA DESIGNATED USES AND CRITERIA

Designated Uses: Existing private and potential public or private supplies of water suitable for drinking without treatment; baseflow for hydraulically-connected surface water bodies.

GA Criteria

Parameter	Criterion
1. Dissolved oxygen	As naturally occurs.
2. Oils and grease	None other than of natural origin.
3. Color and turbidity	None other than of natural origin.
4 Coliform bacteria	None other than of natural origin.
5. Taste and odor	None other than of natural origin.
6. pH	As naturally occurs
7. Chemical constituents	As naturally occurs.

Classifications

GA Ground water within the area of existing private water supply wells or an area with the potential to provide water to public or private water supply wells. The Department presumes that ground water in such an area is, at a minimum, suitable for drinking or other domestic uses without treatment.

CLASS GB DESIGNATED USES AND CRITERIA

Designated Uses: Industrial process water and cooling waters; baseflow for hydraulically-connected surface water bodies; presumed not suitable for human consumption without treatment.

GB Criteria

Ground waters of this class are assumed by the Department to be degraded due to a variety of pollution sources. No specific groundwater quality criteria apply except those that may be promulgated as part of the Site Remediation Regulations required by Section 22a-133k of the General Statutes

Classifications

GB Ground water within a historically highly urbanized area or an area of intense industrial activity and where public water supply service is available. Such ground water may not be suitable for human consumption without treatment due to waste discharges, spills or leaks of chemicals or land use impacts.

CLASS GC DESIGNATED USES AND CRITERIA

Designated Uses: Assimilation of discharges authorized by the Commissioner pursuant to Section 22a-430 of the General Statutes.

GC CRITERIA

No quantitative criteria are specifically determined until such time as a person applies to the Department under Section 22a-430 of the General Statutes to discharge leachate to ground water. The most important consideration in making a determination to classify ground water as GC is the impact of any authorized ground water discharges on adjacent surface waters.

Classifications

GC Ground water to which the Commissioner has authorized a discharge under Section 22a-430 of the General Statutes. In the course of applying for Section 22a-430 authorization, the permittee performed all necessary hydrogeologic studies, secured legal rights to all affected ground waters, and complied with all other requirements of Connecticut's Water Quality Standards and any other applicable law. Ground waters classified as GC are not suitable for development of public supplies of potable water.

Appendices

APPENDIX A: DEFINITIONS

The following definitions are provides in support of the provisions of the Water Quality Standards and are intended to provide additional clarification of terms used within the Water Quality Standards.

Acute Toxicity
means adverse effect such as mortality or debilitation caused by a brief exposure to a toxic substance.

Aesthetics
means the appearance, odor or other characteristics of a surface water which impact human senses and enjoyment of such surface water.

Antidegradation Policy
means Surface Water Quality Standards two through five in the Connecticut Water Quality Standards.

Atmospheric Deposition
means the delivery of airborne substances of both natural and human origin to land and water surfaces which can be deposited with or without rainfall.

Benthic
means associated with the bottom of a surface water body.

Benthic Macroinvertebrates
means animals which are large enough to be seen by the unaided eye and which can be retained by a U. S. standard No. 30 sieve (28 meshes per inch, 0.595 mm openings), and which live at least part of their life cycle within or upon submerged substrates in a body of water. These animals usually consist of the aquatic life stages of various insects and arthropods, mollusks, leeches and worms.

Best Management Practices
means those practices which reduce pollution and which have been determined by the Commissioner to be acceptable based on, but not limited to, technical, economic and institutional feasibility.

Bioaccumulation
means the uptake and retention of substances by an organism from its surrounding medium and/or from food.

Bioconcentration
means the uptake and retention of substances by an organism from its surrounding medium.

Biological Condition Gradient Model
means a descriptive model that describes how ecological attributes change in response to increasing levels of stressors.

Biological Integrity
means the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitats of a region.

Biotic Community (Aquatic)
means a community or group of interacting organisms in a given water body, such as benthic macroinvertebrate and fish assemblages.

Biotic Community Structure
means the taxonomic composition of the biotic community typically including reference to the number of organisms present and their ecological function.

Chronic Toxicity
means an adverse effect, such as reduced reproductive success or growth or poor survival of sensitive life stages occurring as a result of exposure to a substance for a period of time related to the life span of an organism and usually longer than that which causes acute toxicity.

Classification
means the designation of the proposed uses of surface and ground waters with alphabetic characters. Classification does not signify existing water quality.

Clean Water
means water which in the judgment of the Commissioner is of a quality substantially similar to that occurring naturally in the receiving stream under consideration. Clean water may include minor cooling waters, residential swimming pool water, and stormwater.

Coastal Waters
means as defined by Section 22a-93 of the Connecticut General Statutes and means those waters of Long Island Sound and its harbors, embayments, tidal rivers, streams and creeks, which contain a salinity concentration of at least five hundred parts per million under the low flow stream conditions as established by the Commissioner.

Commissioner
means the Commissioner of Environmental Protection or the Commissioner's designated agent as set forth in Section 22a-423 of the Connecticut General Statutes.

Criteria
means components of these Water Quality Standards, expressed in chemical, physical, or biological parameters and their concentrations, mass loading or levels, or by narrative statements, representing a quality of water that supports a particular use.

Department
means the Connecticut Department of Environmental Protection.

Designated Use
means those uses specified in these Water Quality Standards for each surface water or ground water classification, whether or not they are being attained.

Discharge
means as set forth in Sec. 22a-423 of the Connecticut General Statutes.

Domestic Sewage
means wastewater which consists of water and human excretions or other waterborne wastes incidental to the occupancy of a residential building or a non-residential building but not including manufacturing process water, cooling water, wastewater from water softening equipment, commercial laundry wastewater, blowdown from heating or cooling equipment, water from cellar or floor drains or surface water from roofs, paved surfaces, or yard drains.

Dredging Activity
means the excavation, removal or redistribution of sediment from surface waters.

Dredged Material
means sediment that is excavated or dredged from surface waters.

Dredged Material Disposal Area
means an area which has been approved by the Commissioner for disposal of dredged material, including but not limited to federally designated dredged material disposal areas in Long Island Sound.

Ecosystem Function
means the physical, chemical and biological processes that operate within an ecosystem and are essential for the continuing existence of the ecosystem.

Effluent
means treated waste process waters or cooling waters discharged from a waste treatment or manufacturing facility.

Endangered Species
means species listed by CTDEP pursuant to Chapter 495 of the Connecticut General Statute as endangered species. Known locations of endangered species, are identified on maps entitled "State and Federal Listed Species and Significant Natural Communities", as amended. These maps are available at city or town clerk offices and in the CTDEP File Room located on the store level of 79 Elm Street, Hartford.

Existing uses
means those uses actually attained in a water body on or after November 28, 1975, whether or not they are included in water quality standards as defined in Federal Water Quality Standards Regulation (40 CFR Part 131.3).

Fill material
means any material deposited or placed which has the effect of raising the level of the ground surface, whether such surface is above, at, or below the water table, or to replace surface waters with dry land. This term includes, but is not limited to consolidated material such as concrete and brick and unconsolidated material such as sand, gravel and stone.

Geometric Mean
means a measure of central tendency calculated by determining the anti-log of the mean of the logarithms of the values to be averaged.

Ground Waters
means waters flowing through earth materials beneath the ground surface.

Ground Water of Natural Quality
means ground water which is free from pollution by solid waste, wastewater discharges, chemical spills or leaks, pesticides or other anthropogenic sources of water pollution other than acid rain.

High Quality Waters
means surface waters where the water quality is better than necessary to meet the minimum criteria established in these Water Quality Standards for the applicable classification and related designated uses. Factors that may be given consideration when identifying High Quality Waters include but are not limited to the current biological condition, fisheries resources and recreational uses.

Indicator
means a metric or combination of metrics which provides a measure or estimate of the physical, chemical or biological condition.

Indicator bacteria
means a species or group of microbes which are used to conduct microbiological examinations of water in order to determine its sanitary quality and provide evidence of recent fecal contamination from humans or other warm blooded animals.

Indigenous
means animal or plant life which naturally occurs in a particular geographic region.

Invertebrates
means animals lacking a backbone.

Marine Sanitation Device or MSD
means a device installed or used on watercraft for the collection, treatment or disposal of human wastes.

Most Sensitive Use
means the designated use (drinking, swimming, boating, fish and aquatic life propagation, irrigation etc.) which is most susceptible to degradation by a specific pollutant.

Moving Average
means the mean of consecutive values in a time series of a specified duration. For example, a 12 month moving average is calculated by averaging the monthly values for a parameter for the most recent 12 consecutive months; thus as time progresses and more new values are available, old values are dropped resulting in an average value which is always based on the 12 most recent consecutive monthly values.

Native
means indigenous to an area.

Natural
means the biological, chemical and physical conditions and communities that occur within the environment which are unaffected or minimally affected by human influences.

Non-point source
means any unconfined and diffuse source of pollution such as stormwater or snowmelt runoff, atmospheric deposition, or groundwater not conveyed to a surface water discharge point within a discrete conveyance.

Outstanding National Resource Waters
means High Quality Waters within national and state parks and wildlife refuges and waters of exceptional recreation or ecological significance, such as water bodies that are important, unique or sensitive ecologically.

Point source
means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture.

Recreational use
means active or passive water-related leisure activities such as fishing, swimming, boating, and aesthetic appreciation.

Sanitary Survey
means an investigation of a particular geographic area to determine if unlawful or inadequately treated discharges of sewage or other sources of indicator bacteria are present.

Sediments
means any natural or artificial materials which constitute all or part of the banks, bed or bottom of an intermittent or perennial surface water.

Sensitive-rare taxa
means taxonomic groups of organisms that are sensitive to pollution and occur in low numbers in natural aquatic communities.

Sensitive-ubiquitous taxa
means taxonomic groups of organisms that are sensitive to pollution and are typically common and abundant in natural aquatic communities.

Sewage
means as defined in Sec. 22a-423 of the General Statutes and means "human and animal excretions and all domestic and such manufacturing wastes as may tend to be detrimental to the public health.

Significant Natural Communities
means species listed by CTDEP pursuant to Chapter 495 of the Connecticut General Statute as threatened or endangered species or species of special concern. Known locations of threatened and endangered species and species of special concern, and significant natural communities are identified on maps entitled “State and Federal Listed Species and Significant Natural Communities“, as amended. These maps are available at city or town clerk offices and in the CTDEP File Room located on the store level of 79 Elm Street, Hartford.

Special Concern Species

means species listed by CTDEP pursuant to Chapter 495 of the Connecticut General Statute as species of special concern. Known locations of species of special concern are identified on maps entitled "State and Federal Listed Species and Significant Natural Communities", as amended. These maps are available at city or town clerk offices and in the CTDEP File Room located on the store level of 79 Elm Street, Hartford.

Surface Water

means the waters of Long Island Sound, its harbors, embayments, tidal wetlands and creeks; rivers and streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs, federal jurisdictional wetlands, and other natural or artificial, public or private, vernal or intermittent bodies of water, excluding groundwater.

Taxon (pl. Taxa)

means a biological classification category, usually the most specific division attainable in taxonomy.

Technically Practicable

means with respect to ground water remediation, the greatest degree of remediation that can be achieved using sound engineering and hydrogeologic practices.

Technology - Based Treatment

means a level and type of treatment required by Section 301(b) and 304(b) of the Federal Clean Water Act, which is based on the particular manufacturing process used and type of waste generated.

Threatened Species

means species listed by CTDEP pursuant to Chapter 495 of the Connecticut General Statute as threatened. Known locations of threatened species are identified on maps entitled "State and Federal Listed Species and Significant Natural Communities", as amended. These maps are available at city or town clerk offices and in the CTDEP File Room located on the store level of 79 Elm Street, Hartford.

Tolerant Taxa

means taxonomic groups of organisms that are resistant to a variety of pollution or habitat stressors. Typically, tolerant taxa are the last survivors in severely polluted waters.

Toxic Substance

means any substance which can adversely affect the survival, growth or reproduction of fish, other forms of aquatic life, other wildlife or humans exposed thereto either by direct contact or through consumption.

Trophic State

means the level of biological productivity or amount of plant biomass within a water body at the time of measurement.

Use Attainability Analysis

means a structured scientific assessment of the physical, chemical, biological, and economic factors affecting the ability of a surface water to achieve and support uses as described in federal regulation at 40 CFR 131.10.

Water Quality

means the physical, chemical and biological characteristics of surface or ground waters.

Wetlands

means wetlands as defined under sections 22a-28 and 22a-38 of the General Statutes or as defined under the 1987 Corps of Engineers Wetland Delineation Manual, as amended.

Zone of Influence

means an area or volume of surface water or ground water within which some degradation of water quality or inconsistency with water quality criteria is anticipated as a result of a pollutant discharge. The term zone of influence is used to describe an area impacted by thermal, conventional, or toxic pollutants and allocated in accordance with Water Quality Standard 10 for assimilation of such pollutants.

Zone of Passage

means an area or volume of flow in surface water within which pollutants, including temperature will not impede or prohibit the passage of free swimming or drifting aquatic organisms.

7Q10 or Seven-Day, Ten Year Low Flow

means the lowest seven consecutive-day mean stream flow with a recurrence interval of ten years.

APPENDIX B: WATER QUALITY CRITERIA FOR BACTERIAL INDICATORS OF SANITARY QUALITY SEE ALSO STANDARDS # 23 AND 25

DESIGNATED USE	CLASS	INDICATOR	CRITERIA
Freshwater			
Drinking Water Supply [1]			
Existing / Proposed	AA	Total coliform	Monthly Moving Average less than 100/100ml Single Sample Maximum 500/100ml
Potential	A	----	--------
Recreation [2][3]			
Designated Swimming [4]	AA, A, B	*Escherichia coli*	Geometric Mean less than 126/100ml Single Sample Maximum 235/100ml
Non-designated Swimming [5]	AA, A, B	*Escherichia coli*	Geometric Mean less than 126/100ml Single Sample Maximum 410/100ml
All Other Recreational Uses	AA, A, B	*Escherichia coli*	Geometric Mean less than 126/100ml Single Sample Maximum 576/100ml
Saltwater			
Shellfishing [6]			
Direct Consumption	SA	Fecal coliform	Geometric Mean less than 14/100ml 90% of Samples less than 31/100ml
Indirect Consumption	SB	Fecal coliform	Geometric Mean less than 88/100ml 90% of Samples less than 260/100ml
Recreation			
Designated Swimming [4]	SA, SB	Enterococci	Geometric Mean less than 35/100ml Single Sample Maximum 104/100ml
All Other Recreational Uses	SA, SB	Enterococci	Geometric Mean less than 35/100ml Single Sample Maximum 500/100ml

Table Notes:

(1) Criteria applies only at the drinking water supply intake structure.

(2) Criteria for the protection of recreational uses in Class B waters do not apply when disinfection of sewage treatment plant effluents is not required consistent with Standard 23.

(3) See Standard # 25.

(4) Procedures for monitoring and closure of bathing areas by State and Local Health Authorities are specified in: Guidelines for Monitoring Bathing Waters and Closure Protocol, adopted jointly by the Department of Environmental Protection and the Department of Public Health, May 1989, revised April 2003 and updated December 2008.

(5) Includes areas otherwise suitable for swimming but which have not been designated by State or Local authorities as bathing areas, waters which support tubing, water skiing, or other recreational activities where full body contact is likely.

(6) Criteria are based on utilizing the mTec method as specified in the U.S. Food and Drug Administration National Shellfish Sanitation Program-Model Ordinance (NSSP-MO) document *Guide for the Control of Molluscan Shellfish 2007*.

Guidelines for Use of Indicator Bacteria Criteria

Water Quality Classifications identify the designated uses for a waterbody. The classification does not provide information on current water quality or quality of the shellfishing resources. For this reason, the Water Quality Classification should not be considered as a certification of quality by the State or an approval to engage in certain activities such as swimming or shellfish harvest For further information on the water quality within surface waters in Connecticut, please consult the most recent *Integrated Water Quality Report* prepared by CTDEP and published on the Department's website or available by contacting the Planning & Standards Division of the Bureau of Water Protection and Land Reuse at the Connecticut Department of Environmental Protection, 79 Elm Street, Hartford, CT 06106. For more current information on the quality of the shellfishing resources, please contact the Department of Agriculture, Bureau of Aquaculture, P.O. Box 97, Milford, CT 06460.

APPENDIX C: DISSOLVED OXYGEN (DO) CRITERIA FOR CLASS SA AND SB WATERS

***Background**:* Dissolved oxygen criteria for Class SA and SB waters are based on the Environmental Protection Agency's *Ambient Water Quality Criteria for Dissolved Oxygen (Saltwater): Cape Cod to Cape Hatteras*, noticed November 30, 2000 in the Federal Register (65(231):71317-71321).

***Area Affected**:* DO criteria apply to all Class SA and SB waters.

Cumulative DO exposure parameters: DO conditions in the area affected do not readily lend themselves to a single numeric criterion. Aquatic organisms are harmed based on a combination of minimum oxygen concentration and duration of the low DO excursion. Based on EPA's guidance, a DO concentration of 4.8 mg/l would meet the chronic criteria for growth and protect marine organisms regardless of duration. If oxygen fell within a 0.5 mg/l incremental range below 4.8 mg/l (*e.g.*, between 4.3 and 4.8 mg/l), a duration of 21 days or less would meet resource protection goals. Connecticut DEP established similar exposure allowances based upon EPA research and data, for 0.5 mg/l and 0.3 mg/l increment ranges (see Table 1). The minimum DO level that can occur, according to the EPA DO criteria document (i.e. the level below which there would be no exposure period consistent with resource protection) is 2.3 mg/l. Given the environmental variability, Connecticut DEP has used a more protective minimum DO criterion of 3.0 mg/l with an exposure allowance of no more than 2 days.

Table 1. Dissolved Oxygen Chronic Cumulative Exposure Criteria for incremental ranges (0.5 mg/l and 0.3 mg/l) applicable to Class SA and SB waters.

DO Range (mg/l)		No. of Days Allowed
<4.8	≥ 4.5	30
<4.5	≥ 4.0	14
<4.0	≥ 3.5	7
<3.5	≥ 3.0	2

Because marine systems are variable, DO levels are unlikely to remain within one of the four incremental ranges presented in Table 1. Typically, DO conditions would fall through a range to a minimum and then begin to rebound depending on weather and stratification conditions. To account for this, the number of days within each incremental DO range is pro-rated, as follows. A decimal fraction is calculated for each range, *e.g.*, 10.5 days in the 4.5-4.8 mg/l range would produce a decimal fraction of 0.35(10.5 days/ 30 days). As long as the sum of those fractions calculated for each range is less than 1.0, resource protection goals are maintained for larval recruitment.

In cases where data collection yields continuous DO readings or more frequent sampling results, the data can be interpreted using a 0.1 mg/l interval range. The number of allowable days is determined using the following method:

$$DO_i = 13.0 / (2.80 + 1.84e^{-0.10t_i})$$

where:

DO*i* = allowable DO concentration (mg/l)
t_i = exposure interval duration in days
i = exposure interval

However, since most sampling programs do not result in frequent readings, a greater interval (presented in Table 1) is recommended. Use of a larger interval results in a larger sum of fractions and is subsequently a more conservative measure of consistency with the WQS.

For information regarding interpretation of dissolved oxygen criteria to determine compliance, refer to the most recent edition of the *Connecticut Consolidated Assessment and Listing Methodology* included in the *Integrated Water Quality Report to Congress* available on the Connecticut Department of Environmental Protection website or by contacting the Connecticut Department of Environmental Protection, Planning & Standards Division, Bureau of Water Protection and Land Reuse, 79 Elm Street, Hartford CT 06106.

APPENDIX D: NUMERICAL WATER QUALITY CRITERIA FOR CHEMICAL CONSTITUENTS

Numerical Water Quality Criteria for Chemical Constituents (ug/L)[1]								
		Aquatic Life Criteria [(2)(3)]				Human health Criteria		
		Freshwater: Class AA, A & B		Saltwater Class SA & SB		Class B, SA & SB Waters	Class AA & A Waters	
Chemical Constituents	CASRN	Acute[4]	Chronic[5]	Acute[4]	Chronic[5]	Consumption of Fish	Consumption of Water & Fish	Health Designation[6]
Inorganics[7]								
Antimony	7440360					640	5.6	TT
Arsenic (total)	7440382	340	150	69	36	0.021	0.011	A
Beryllium	7440417					0.13	0.0077	TT
Cadmium	7440439	1.0	0.125	40	8.8	10,769	5	TT
Chromium (hex)	18540299	16	11	1,100	50	2,019	100	TT
Chromium (tri)	16065831	323	42			1,009,615	100	TT
Copper	7440508	14.3[8]	4.8[9]	4.8	3.1		1,300	TT
Copper (site-specific)[10]	7440508	25.7	18.1				1,300	TT
Cyanide (Total)	57125	22	5.20	1	1	140	140	TT
Lead	7439921	30	1.2	210	8.1		15	TT
Mercury (Total)	7439976	1.4	0.77	1.8	0.94	0.051	0.050	TT-HB
Nickel	7440020	260.5	28.9	74	8.2	4,600	610	TT
Selenium (Total)	7782492	20	5	290	71	4,200	50	TT
Silver	7440224	1.02		1.9		107,692	175	TT
Thallium	7440280					0.47	0.24	TT
Zinc	7440666	65	65	90	81	26,000	7,400	TT
Volatiles								
Acrolein	107028	3	3			9	6	TT

Numerical Water Quality Criteria for Chemical Constituents (ug/L)[1]								
		Aquatic Life Criteria [(2)(3)]				Human health Criteria		
		Freshwater: Class AA, A & B		Saltwater Class SA & SB		Class B, SA & SB Waters	Class AA & A Waters	
Chemical Constituents	CASRN	Acute[4]	Chronic[5]	Acute[4]	Chronic[5]	Consumption of Fish	Consumption of Water & Fish	Health Designation[6]
Acrylonitrile	107131					0.25	0.051	C
Benzene	71432					51	1.2	A
Bromoform	75252					140	4.3	C
Carbon Tetrachloride	56235					1.6	0.23	C
Chlorobenzene	108907					1,600	100	TT
Chlorodibromomethane	124481					13	0.40	C
Chloroethane	75003							
2-Chloroethylvinyl Ether	110758							
Chloroform	67663					470	5.7	C
Dichlorobromomethane	75274					17	0.55	C
1,1-Dichloroethane	75343							
1,2-Dichloroethane	107062					37	0.38	C
1,1-Dichloroethylene	75354					3.2	0.057	C
1,2T-Dichloroethylene	156605					10,000	100	TT
1,2-Dichloropropane	78875					15	0.50	TT
1,3-Dichloropropylene	542756					21	0.34	TT
Ethylbenzene	100414					2,100	530	TT
Methyl Bromide	74839					1,500	47	TT
Methyl Chloride	74873					470	5.7	TT
Methylene Chloride	75092					590	4.6	C
1,1,2,2,-Tetrachloroethane	79345					4.0	0.17	C-HB

Numerical Water Quality Criteria for Chemical Constituents (ug/L)[1]								
		Aquatic Life Criteria [(2)(3)]				Human health Criteria		
		Freshwater: Class AA, A & B		Saltwater Class SA & SB		Class B, SA & SB Waters	Class AA & A Waters	
Chemical Constituents	**CASRN**	**Acute[4]**	**Chronic[5]**	**Acute[4]**	**Chronic[5]**	**Consumption of Fish**	**Consumption of Water & Fish**	**Health Designation[6]**
Tetrachloroethylene	127184					3.3	0.69	TT
Toluene	108883					15,000	1,000	TT
1,1,1,-Trichloroethane	71556							
1,1,2-Trichloroethane	79005					16	0.59	C
Trichloroethlyene	79016					30	2.5	C
Vinyl Chloride	75014					2.4	0.025	C
GC/MS: Acid Compounds								
2-Chlorophenol	95578					150	81	TT
2,4-Dichlorophenol	120832					290	77	TT
2,4-Dimethylphenol	105679					850	380	TT
3-Methyl-4-chlorophenol	59507							
2-Methyl-4,6-Dinitrophenol	534521					280	13	TT
2,4-Dinitrophenol	51285					5,300	69	TT
2-Nitrophenol	88755							
4-Nitrophenol	100027							
Pentachlorophenol	87865	19	15	13	7.9	3.0	0.27	C-HB
Phenol	108952					860,000	10,000	TT
2,4,6-Trichlorophenol	88062					2.4	1.4	C-HB
Base Neutral Compounds								
Acenaphthene	83329					6.1	2.7	TT-HB
Acenapthylene	208968					49.2	4.37	C-HB

Numerical Water Quality Criteria for Chemical Constituents (ug/L)[1]								
		Aquatic Life Criteria [(2)(3)]				Human health Criteria		
		Freshwater: Class AA, A & B		Saltwater Class SA & SB		Class B, SA & SB Waters	Class AA & A Waters	
Chemical Constituents	CASRN	Acute[4]	Chronic[5]	Acute[4]	Chronic[5]	Consumption of Fish	Consumption of Water & Fish	Health Designation[6]
Anthracene	120127					4.92	0.44	C-HB
Benzidene	92875					0.00020	0.000086	A
Benzo(a)anthracene	56553					0.018	0.0038	C-HB
Benzo(a)pyrene	50328					0.018	0.0038	C-HB
Benzo(b)fluoranthene	205992					0.018	0.0038	C-HB
Benzo(ghi)perylene	191242					4.92	0.44	C-HB
Benzo(k)fluoranthene	207089					0.018	0.0038	C-HB
Bis(2-chloroethoxy)Methane	111911							
Bis(2-Chloroethyl)Ether	111444					0.53	0.030	C
Bis(2-Chloroisopropyl)Ether	108601					65,000	1,400	TT
Bis(2-Ethylhexyl)Phthalate	117817					2.2	1.2	C-HB
4-Bromophenylether	101553							
Butyl Benzyl Phthalate	85687					1,900	1,500	TT-HB
2-Chloronapthylene	91587					1,600	1,000	TT-HB
4-Chlorophenylphenylether	7005723							
Chrysene	218019					0.018	0.0038	C-HB
Dibenzo(a,h)anthracene	53703					0.010	0.0009	C-HB
1,2-Dichlorobenzene	95501					1,300	420	TT-HB
1,3-Dichlorobenzene	541731					960	320	TT-HB
1,4-Dichlorobenzene	106467					190	63	TT-HB
3,3’-Dibenzidenes	91941					0.028	0.021	C-HB

Numerical Water Quality Criteria for Chemical Constituents (ug/L)[1]								
		Aquatic Life Criteria [(2)(3)]				Human health Criteria		
		Freshwater: Class AA, A & B		Saltwater Class SA & SB		Class B, SA & SB Waters	Class AA & A Waters	
Chemical Constituents	CASRN	Acute[4]	Chronic[5]	Acute[4]	Chronic[5]	Consumption of Fish	Consumption of Water & Fish	Health Designation[6]
Diethyl Phthalate	84662					44,000	17,000	TT
Dimethyl Phthalate	131113					1,100,000	270,000	TT
Di-n-butyl Phthlate	84742					4,500	2,000	TT-HB
Di-n-octyl Phthalate ester	117840							
2,4-Dinitrotoluene	121142					3.4	0.11	C
2,6-Dinitrotoluene	606202							
Di-n-ocytyl phthalate	117840							
1,2-Diphenylhydrazine	122667					0.20	0.036	C
Fluoranthene	206440					1.28	1.01	C-HB
Fluorene	86737					49.2	4.37	C-HB
Hexachlorobenzene	118741					0.00029	0.00028	C-HB
Hexachlorobutadiene	87683					18	0.44	C-HB
Hexachlorocyclopentadiene	77474					1,100	40	TT-HB
Hexachloroethane	67721					3.3	1.4	C-HB
Indeno (1,2,3-cd) pyrene	193395					0.018	0.0038	C-HB
Isophorone	78591					960	35	TT
Napthalene	91203					20,513	677	TT
Nitrobenzene	98953					690	17	TT
N-Nitrosodimethylamine	62759					3	0.00069	C
N-Nitrosodi-N-propylamine	621647					0.51	0.005	C
N-Nitrosodiphenylamine	86306					6.0	3.3	C

Numerical Water Quality Criteria for Chemical Constituents (ug/L)[1]								
		Aquatic Life Criteria [(2)(3)]				Human health Criteria		
		Freshwater: Class AA, A & B		Saltwater Class SA & SB		Class B, SA & SB Waters	Class AA & A Waters	
Chemical Constituents	**CASRN**	**Acute[4]**	**Chronic[5]**	**Acute[4]**	**Chronic[5]**	**Consumption of Fish**	**Consumption of Water & Fish**	**Health Designation[6]**
Phenanthrene	85018					49.17	4.37	C-HB
Pyrene	129000					49.17	4.37	C-HB
1,2,4-Trichlorobenzene	120821					70	35	TT
Pesticides								
Aldrin	309002	1.50		0.65		0.00005	0.000049	C-HB
Chlordane	57749	1.20	0.0043	0.045	0.004	0.00081	0.00080	C-HB
DDT	50293	0.55[11]	0.001[11]	0.065[11]	0.001[11]	0.00022	0.00022	C-HB
DDD	72548					0.00031	0.00031	C-HB
DDE	72559					0.00022	0.00022	C-HB
Dieldrin	60571	0.24	0.056	0.355	0.0019	0.000054	0.000052	C
Endosulfan Alpha	959988	0.11[12]	0.056[12]	0.017[12]	0.0087[12]	89	62	TT
Endosulfan Beta	33213659	0.11[12]	0.056[12]	0.017[12]	0.0087[12]	89	62	TT
Endosulfan Sulfate	1031078					89	62	TT
Endrin	72208	0.086	0.036	0.0185	0.0023	0.060	0.059	TT
Endrin Aldehyde	7421934					0.30	0.29	TT
Heptachlor	76448	0.26	0.0038	0.0265	0.0036	0.000079	0.000079	C
Hetachlor epoxide	1024573	0.26	0.0038	0.0265	0.0036	0.000039	0.000039	C
Hexachlorocyclohexane alpha	319846					0.0049	0.0026	C-HB
Hexachlorocyclohexane beta	319857					0.017	0.0091	C-HB
Hexachlorocyclohexane delta	319868							
Hexachlorocyclohexane gamma (Lindane)	58899	0.95		0.08		0.063	0.019	TT-HB

Numerical Water Quality Criteria for Chemical Constituents (ug/L)[1]								
		Aquatic Life Criteria [(2)(3)]				Human health Criteria		
		Freshwater: Class AA, A & B		Saltwater Class SA & SB		Class B, SA & SB Waters	Class AA & A Waters	
Chemical Constituents	**CASRN**	**Acute[4]**	**Chronic[5]**	**Acute[4]**	**Chronic[5]**	**Consumption of Fish**	**Consumption of Water & Fish**	**Health Designation[6]**
Polychlorinated Biphenyls[13]			0.014		0.03	0.000064	0.000064	C-HB
2,3,7,8-TCDD (Dioxin)	1746016					0.0000000051	0.000000005	C-HB
Toxaphene	8001352	0.73	0.0002	0.21	0.0002	0.00028	0.00028	C-HB
Other Susbstances								
Aluminum	7429905	750	87					
Ammonia	7664417	*	**	233[15]	35[15]			
Asbestos	1332214						7 Million fibers per liter	A
Chlorine	7782505	19	11	13	7.5			
Chloride	16887006	860,000	230,000					

*See Table Note 14-A
**See Table Notes 14B & 14C

Table Notes:

1 The minimum data necessary to determine consistency with Connecticut Water Quality Standards shall be subject to the Commissioner's discretion and may not be limited to or include chemical analysis results for all of the constituents listed in Appendix D

2 Aquatic life criteria for freshwater may be used for saltwater if criteria for saltwater is unavailable.

3 For brackish waters, use the more restrictive of the aquatic life criteria for freshwater and for saltwater.

4 Biological integrity is impaired by an exposure of one hour or longer to a concentration which exceeds the acute criteria more frequently than once every three years on average.

5 Biological integrity is impaired when the four-day average concentration exceeds the chronic criteria more frequently than once every three years on average

6 The commissioner will consider the following human health designations in allocating zones of influence for discharges

A:	Class A carcinogen (known human carcinogen)
TT:	Threshold Toxicant, not carcinogenic
C:	Carcinogenic (probable or possible carcinogen)
HB:	High potential to bioaccumulate or bioconcentrate

7 Criteria apply to the dissolved fraction of ambient waters unless otherwise noted.

8 Biological integrity is impaired when the ambient concentration exceeds this value on more than 5% of days in any year.

9 Biological integrity is impaired when the ambient concentration exceeds this value on more than 50% of days in any year.

10 Site-specific criteria for copper apply for the following waters:

Bantam River	Litchfield POTW to confluence with Shepaug River
Blackberry River	Norfolk POTW to confluence with Roaring Brook
	North Canaan POTW to confluence with Housatonic River
Factory Brook	Salisbury POTW to mouth
Five Mile River	New Canaan POTW to mouth
Hockanum River	Vernon POTW to confluence with Connecticut River
Mill Brook	Plainfield Village POTW to mouth
Naugatuck River	Torrington POTW to confluence with Housatonic River
Norwalk River	Ridgefield Brook to Branchville
Pequabuck River	Plymouth POTW to confluence with Farmington River
Pootatuck River	Newtown POTW to confluence with the Housatonic River
Quinnipiac River	Southington POTW to Broadway, North Haven
Still River	Winsted POTW to confluence with Farmington River
Still River	Limekiln Brook to confluence with Housatonic River
Williams Brook	Ledyard POTW to mouth
Willimantic River	Stafford Springs POTW to Trout Management Area (Willington)
	Eagleville Dam to confluence with Shetucket River

11 This criterion applies to DDT and its metabolites (i.e. the total concentration of DDT and its metabolites should not exceed this value)

12 This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha endosulfan and beta endosulfan.

13 Criteria are applicable to total PCB's (e.g. the sum of all con genes or all isomer or homolog or Arochor analyses)

14 Criteria for ammonia, (mg/L as N) vary in response to ambient surface water temperature (T, degrees C) and pH. Biological integrity is considered impaired when:

A The one-hour average concentration of total ammonia exceeds:

$[0.275/(1+10^{(7.204-pH)})] + [39.0/(1+10^{(pH-7.204)})]$ when salmonids are present

Or

$[0.411/(1+10^{(7.204-pH)})] + [58.4/(1+10^{(pH-7.204)})]$ when salmonids are absent

B The four-day average concentration of total ammonia exceeds 2.5 times the value obtained from the formula in 14.c. below.

C The 30-day average concentration of total ammonia exceeds:

$[0.0577/(1+10^{(7.688-pH)})] + [2.487/(1+10^{(pH-7.688)})] \times [MIN(2.85, 1.45 \times (10^{(0.028(25-T)})))]$

when early life stages are present;

or

$[0.0577/(1+10^{(7.688-pH)})] + [2.487/(1+10^{(pH-7.688)})] \times [1.45 \times (10^{(0.028(25-MAX(T,7))})]$

when early life stages are absent.

15 Saltwater ammonia criteria are expressed as un-ionized ammonia (NH_3). Equivalent total ammonia concentrations are dependent on receiving water temperature, pH, and salinity.

Conversion of un-unionized ammonia concentrations to total ammonia ($NH_3 + NH_4^+$) may be performed using the procedure described in "Ambient Water Quality Criteria for Ammonia (Saltwater) – 1989", EPA 440/5-88-004.

APPENDIX E: CONNECTICUT ANTIDEGRADATION IMPLEMENTATION POLICY

I. PURPOSE

The purpose of this policy is to establish procedures to implement Connecticut's Antidegradation Policy as required by the federal Clean Water Act (Title 40 Part 131.12) and Connecticut's Surface Water Quality Standards 2 through 5. This policy requires the maintenance and protection of water quality in high quality waters and protection and maintenance of existing uses and the level of water quality necessary to protect those uses in all cases.

II. APPLICABILITY

The procedures outlined in this policy apply to:

1. Any discharge or activity that is affecting or may affect water quality in Connecticut, including but not limited to any existing, new or increased activity or discharge requiring a permit, water quality certificate or authorization pursuant to Chapters 439, 440, 445 or 446i-k of the Connecticut General Statutes. Such discharges or activities include, but are not limited to point sources, contaminated groundwater plumes, nonpoint sources (including atmospheric deposition), and dredging activity or discharge of dredged or fill materials to surface waters or any activity or discharge generated by the construction, operation or maintenance of facilities or requiring State authorization in accordance with Section 307 of the Federal Coastal Zone Management Act.

2. A discharge or activity is considered an increased discharge or activity if:

   A. A pollutant would be released as a result of the discharge or activity at an increased concentration or mass which may lower water quality;

   B. The discharge or activity would result in a increased biological, chemical or physical stress on the waterbody; or

   C. The area and/or volume of receiving water flow of a previously allocated zone of influence established and approved by the Commissioner for a discharge or activity would be increased to accommodate the discharge or activity.

3. A discharge or activity which does not have a permit, water quality certificate or authorization from the Commissioner shall be deemed a new discharge or activity.

III. GENERAL PROVISIONS

1. The Commissioner shall implement the Antidegradation Policy by incorporating it into the review of applications for permits, water quality certifications and authorizations for any discharge or activity as described in Section II of this policy.

2. The Commissioner shall not issue any permit, water quality certificate or authorization for a discharge or activity unless the Commissioner finds that all existing and designated uses as

defined in these water quality standards will be fully protected and the discharge or activity is consistent with the designated uses established in these Water Quality Standards for the class of water affected by the discharge or activity, any duly adopted Total Maximum Daily Load analysis and this policy.

3. Implementation of the Antidegradation Policy shall follow a tiered approach pursuant to the federal regulations (Title 40 Part CFR 131.12) and consistent with the Connecticut Antidegradation Policy. For the purposes of implementing this policy, the following review tiers are established for the applicable waters identified below:

Category of Water	Tier of Antidegradation Review	Discharge or Activity
All Waters	Tier 1	All
High Quality Waters & Wetlands	Tier 1 and Tier 2	New or Increased
Outstanding National Resource Waters	Tier 1 and Tier 3	New or Increased

4. In those cases where a thermal discharge is involved, the antidegradation evaluation and implementation shall be consistent with Section 316 of the federal Clean Water Act.

IV. TIER 1 ANTIDEGRADATION EVALUATION AND IMPLEMENTATION REVIEW

Purpose: The purpose of the Tier 1 Antidegradation Evaluation and Implementation Review is to ensure that existing and designated uses of surface waters and the water quality necessary for their protection are maintained and preserved consistent with Connecticut Water Quality Standard 2.

The Commissioner shall determine whether the discharge or activity is consistent with the maintenance, restoration, and protection of existing and designated uses assigned to the receiving water body by considering all relevant available data and the best professional judgment of Department staff. All narrative and numeric water quality standards, criteria and associated policies contained in the Connecticut Water Quality Standards shall form the basis for such evaluation considering the discharge or activity both independently and in the context of other discharges and activities in the affected water body and considering any impairment listed pursuant to Section 303d for the federal Clean Water Act or any TMDL established for the water body.

V. TIER 2 ANTIDEGRADATION EVALUATION AND IMPLEMENTATION REVIEW

Purpose: The purpose of the Tier 2 Antidegradation Evaluation and Implementation Review is to ensure that for all wetlands and surface waters with an existing quality better than the Standards and Criteria established in these Water Quality Standards are maintained at their existing high quality, pursuant to Connecticut Water Quality Standard 3.

1. The Commissioner shall determine whether the new or increased discharge or activity will result in a significant lowering of water quality in a high quality water or any wetland by utilizing all relevant available data and the best professional judgment of Department staff and considering the discharge or activity both independently and in the context of other discharges and activities in the affected water body and considering any TMDL established for the water body. The Commissioner may determine only under the following circumstances that a proposed new or increased discharge or activity would not reasonably be expected to significantly lower water quality in high quality waters or wetlands:

A. The discharge or activity is temporary, occurring over a period of days or months, not years;

B. Water quality in the receiving water will be equal to or better than that which existed prior to commencement of the discharge or activity; or

C. For new or increased discharges or activities resulting from stormwater the first inch of rainfall is not discharged to a surface water body and Best Management Practices deemed necessary to protect and maintain designated uses and meet State Standards and Criteria are implemented.

2. If the Commissioner, after evaluation of the new or increased discharge or activity, determines that such discharge or activity will significantly lower water quality in a high quality water or wetland, the Commissioner shall not issue a permit, certificate or authorization unless the Commissioner finds that:

A. There is no technically or economically feasible alternative to the discharge or activity; and

B. That allowing lower water quality is necessary to accommodate overriding economic or social development in the state and in the area in which the receiving water is located which the Commissioner has determined is clearly in the public interest.

The Commissioner shall ensure that, notwithstanding a lowering of water quality, existing and designated uses will be fully protected and that the highest statutory and regulatory requirements will be achieved for all new and existing point source discharges and cost-effective and reasonable best management practices for nonpoint source and stormwater controls will be implemented consistent with Standard 4 of these Water Quality Standards.

3. Alternatives Analysis:

The applicant for a new or increased discharge or activity that would result in a significant lowering of water quality in a receiving surface water shall demonstrate to the Commissioner's satisfaction that appropriate alternatives have been adequately considered. The alternatives analysis shall include but not be limited to:

A. alternative locations for the proposed discharge or activity;

B. reduction in scale of the proposed discharge or activity;

C. pollution prevention measures which could eliminate or minimize the effects of the proposed discharge or activity;

D. water use or recycle measures which could eliminate or minimize the effects of the discharge or activity;

E. process changes or alternative technology which could minimize the effects of the proposed discharge or activity;

F. improved operation and maintenance of existing facilities in order to minimize the effects of the proposed discharge or activity;

G. alternative methods of treatment and advanced treatment beyond applicable technology requirements of the Clean Water Act;

H. improved best management practices to reduce or minimize stormwater or nonpoint source pollution; and

I. any other alternative required by the Commissioner to minimize the effects of the proposed discharge or activity.

4. Evaluation of Alternatives

A. If an alternative to the new or increased discharge or activity is identified that would not significantly lower water quality, such alternative approach shall be required provided the alternative is technically and economically feasible. Further evaluation of the discharge or activity under Tier 2 Antidegradation Evaluation and Implementation Procedures would not be needed if a demonstration could be made to the Commissioner's satisfaction that the alternative to the new or increased discharge or activity would not result in a significant lowering of water quality.

B. If an alternative to the proposed discharge activity is identified that would result in a reduction of the impact of such discharge or activity on water quality within the receiving water, but still significantly lower water quality, all technically and economically feasible alternatives and management practices should be required and applied in an Evaluation of Overriding Social and Economic Need.

C. If no technically or economically feasible alternative to the new or increased discharge activity is found that would render the impact of the proposed discharge or activity insignificant and not lower water quality in the receiving water, an Evaluation of Overriding Social and Economic Need shall be conducted.

5) Evaluation of Overriding Social or Economic Need:

The applicant for a new or increased permit or activity which the Commissioner finds will cause a significant lowering of water quality shall demonstrate to the Commissioner's satisfaction the overriding economic or social benefits to the State and to the area in which the receiving water is located that will result from the discharge or activity. This evaluation shall be consistent with applicable federal guidance for economic evaluations and consider, but not be limited to:

(A) the loss or reduction of aquatic life, aquatic habitat including riparian vegetation, passive and active recreational value, and aesthetic value which may result from lower water quality;
(B) a description of the current level of water quality and the impact that the proposed action will have on water quality, including synergistic and cumulative effects;
(C) a cost/benefit analysis for the discharge or activity
(D any reduction in water quality which may interfere with, or become injurious to, existing or potential uses or inequitably impact any population groups;
(E) the effect of the project on other services or programs and identification of the appropriate agencies which have been notified of the proposed action;
(F) the potential for facility expansion, production increase or employment growth;
(G) direct and indirect income effects;
(H) increases in community tax base;
(I) industrial, commercial or residential growth in the community;
(J) correction of an environmental or public health problem; and
(K) a statement and discussion concerning the necessity of allowing lower water quality to accommodate important economic development.

VI. TIER 3 ANTIDEGRADATION EVALUATION AND IMPLEMENTATION REVIEW

Purpose: The purpose of the Tier 3 Antidegradation Evaluation and Implementation Review is to ensure that existing and designated uses of surface waters and the water quality necessary for their protection is maintained and protected pursuant to Connecticut Water Quality Standard 2 and that water quality in Outstanding National Resource Waters is maintained and protected pursuant to Connecticut Water Quality Standard 5.

The Commissioner shall determine whether the new or increased discharge or activity is consistent with the maintenance, restoration, and protection of existing and designated uses for the water body in accordance with the preceding Tier 1 Antidegradation Evaluation and Implementation Procedures in this Antidegradation Implementation Policy and that water quality in Outstanding National Resource Waters is maintained and protected. At a minimum, evaluation of potential impacts to water quality in Outstanding National Resource Waters shall be considered except if the activity or discharge:

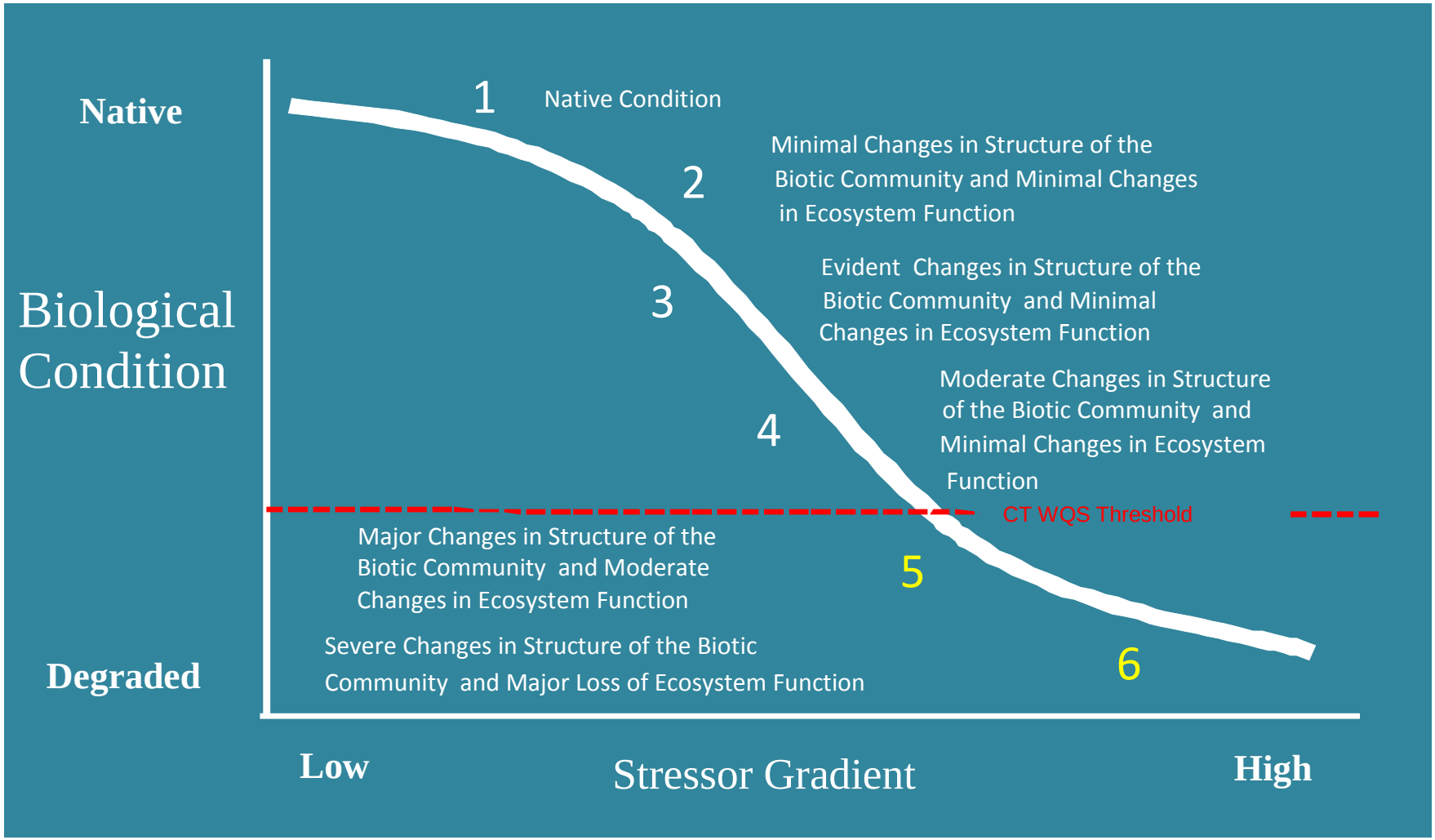
A. will improve water quality or is necessary for maintenance of current environmental conditions;
B. The discharge or activity is short term and temporary occurring over a period of days or months, not years; or

C. Water quality in the receiving water will be equal to or better than that which existed prior to commencement of the new or increased discharge or activity.

VII. PUBLIC PARTICIPATION REQUIREMENTS

The Commissioner shall assure that public participation pursuant to the federal Clean Water Act (Title 40 Part 131.12(a)(2)) is given for all actions for which a review for consistency with Connecticut's Antidegradation Policy is conducted. The Commissioner shall also assure that the degradation in water quality will be reviewed by other appropriate government agencies and that the public will be given an opportunity to comment. The public process will be conducted in accordance with the public notice and hearing requirements of Chapter 440 or 446k of the Connecticut General Statutes, Section 401 of the federal Clean Water Act or Section 307 of the federal Coastal Zone Management Act, as applicable. Any such notice or notice of a hearing shall include the Commissioner's finding with regard to compliance with this Anti-Degradation Policy.

APPENDIX F: CONNECTICUT BIOLOGICAL CONDITION GRADIENT MODEL



The Connecticut Biological Condition Gradient Model is based on published scientific literature (Davies and Jackson 2006) and provides a model to illustrate the relationship between the amount of stress on the environment and its effect on biological communities. Stressors are diverse and may be biological, chemical or physical in nature. In accordance with the Biological Condition Gradient Model, as the level of stress gets progressively greater, the biological communities, which start out in a natural condition, begin to change as they respond to the stress. In general, this model is applicable to many different types of biological communities. Within the aquatic communities, it could be applied to fish, benthic invertebrates or periphyton communities, among others. In all cases, it provides a more refined scale by which the health of biological communities in Connecticut's ecosystems can be described relative to the conditions which affect them.

1. Native condition: Native structural, functional and taxonomic integrity is preserved; ecosystem function is preserved within the range of natural variability.

2. Minimal changes in structure of the biotic community and minimal changes in ecosystem function: Virtually all native taxa are maintained with some changes in biomass and/or abundance; ecosystem functions are fully maintained within the range of natural variability.

3. Evident changes in structure of the biotic community and minimal changes in ecosystem function: Evident changes in structure due to loss of some sensitive-rare taxa; shifts in relative abundance of taxa but sensitive-ubiquitous taxa are common and abundant; ecosystem functions are fully maintained through redundant attributes of the system.

4. Moderate changes in structure of the biotic community with minimal changes in ecosystem function: Moderate changes in structure due to replacement of some sensitive-ubiquitous taxa by more tolerant taxa, but reproducing populations of some sensitive taxa are maintained; overall balanced distribution of all expected major groups; ecosystem functions largely maintained through redundant attributes.

5. Major changes in structure of the biotic community and moderate changes in ecosystem function: Sensitive taxa are markedly diminished; conspicuously unbalanced distribution of major groups from that expected; organism condition shows signs of physiological stress; ecosystem function shows reduced complexity and redundancy; increased build-up or export of unused materials.

6. Severe changes in structure of the biotic community and major loss of ecosystem function: Extreme changes in structure; wholesale changes in taxonomic composition; extreme alterations from normal densities and distributions; organism condition is often poor; ecosystem functions are severely altered.

Reference:

Davies, S. P. and S. K. Jackson. 2006. The Biological Condition Gradient: A Descriptive Model for Interpreting Change in Aquatic Ecosystems. Ecological Applications 16(4): 1251-1266.