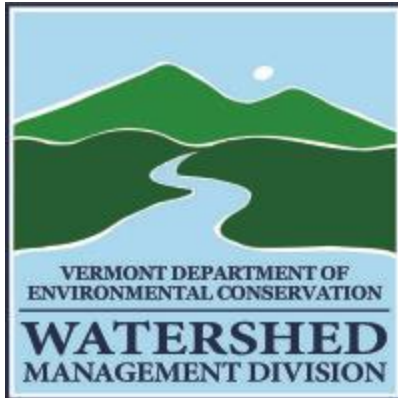


Presented below are water quality standards that are in effect for Clean Water Act purposes.

EPA is posting these standards as a convenience to users and has made a reasonable effort to assure their accuracy. Additionally, EPA has made a reasonable effort to identify parts of the standards that are not approved, disapproved, or are otherwise not in effect for Clean Water Act purposes.

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Vermont Water Quality Standards
Environmental Protection Rule Chapter 29(a)

Effective October 30, 2014

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Section 1-01 *Applicability and Definitions*

A. Applicability

1. Pursuant to 10 V.S.A. Chapter 47, after the classification of any waters has been established, those waters shall be managed by the Secretary in order to obtain and maintain the classification. The Secretary may enforce a classification and these rules against any person affected thereby who, with notice of the classification, has failed to comply.
2. Concerning any application, the Water Quality Standards in effect at the time of the filing shall apply. These Water Quality Standards shall apply to those applications, including applications for the renewal of existing approvals, that are filed on or after the date upon which the amended standards become effective, and to all other activities that occur after that date. These rules shall apply to all “waters of the United States” as defined in 40 C.F.R. §122.2 (1995). Application of these rules to waters of the United States shall not require the issuance of a state or federal permit, license, certification or approval for discharges or activities where no such permit, license, certification or approval requirement exists under applicable state or federal law, including, but not limited to, discharges and activities that satisfy the exemptions and exclusions set forth at 40 C.F.R. §122.3 and §232.3 (1995).
3. In the event any of these rules, or any portion thereof, is found by a court of competent jurisdiction to be illegal or void, the remainder thereof shall be deemed unaffected and shall continue in full force and effect.
4. The following exclusions apply only to artificial bodies of water that were not originally created in waters or did not result from impoundment of waters:
 - a. Off stream reservoirs (such as snowmaking ponds) may be subject to water level fluctuations that are necessary to achieve the purposes for which the reservoir was constructed and accordingly, shall not be required to meet the criteria of these rules impacted by water level fluctuations in the reservoir;
 - b. Waste treatment systems (including waste management systems constructed as part of Best Management Practices under 6 V.S.A. Chapter 215 and treatment ponds, lagoons, or wetlands created solely to meet the requirements of a permit issued for a discharge) determined to be necessary to achieve compliance with these rules shall not be required to be managed as waters under these rules.
5. Waters created exclusively by rainfall or snowmelt events, such as puddles and overland flow, that are so temporary in nature that they do not support the existing and designated uses, shall not be considered waters.

B. Definitions

For the purposes of these Water Quality Standards, the terms below shall have the following meanings unless a different meaning clearly appears from the context.

1. **Accepted agricultural or silvicultural practices** means those land management practices adopted by the secretary of agriculture, food and markets, and the commissioner of forests, parks and recreation, respectively, in accordance with applicable state law.
2. **Act** means the “Vermont Water Pollution Control Act.” See, 10 V.S.A., Chapter 47.
3. **Applicable water quality criteria** means all criteria specified in § 3-01, as well as those specified in §§ 3-02(B), 3-03(B) and 3-04(B) that are applicable to the classification and Water Management Type of the waters in question.
4. **Application** means any request for a permit required by state or federal law when filed with, and deemed complete by, the reviewing authority.
5. **Aquatic biota** means all organisms that, as part of their natural life cycle, live in or on waters.
6. **Aquatic habitat** means the physical, chemical, and biological components of the water environment.
7. **Assimilative capacity** means a measure of the capacity of the receiving waters to assimilate wastes without lowering their quality below the applicable water quality criteria.
8. **Basin plan** means a plan prepared by the Secretary for each of Vermont’s 17 basins (see Chapter 4 of these rules) in conjunction with the basin planning process required by the Federal Clean Water Act and 40 C.F.R. Part 130, the Act, and the provisions of § 1-02 (D) of these rules.
9. **Best management practices** means a practice or combination of practices that may be necessary, in addition to any applicable Accepted Agricultural or Silvicultural Practices, to prevent or reduce pollution from nonpoint source wastes to a level consistent with the applicable provisions of these rules.
10. **Biological integrity** means the ability of an aquatic ecosystem to support and maintain, when consistent with reference conditions, a community of organisms that is not dominated by any particular species or functions (balanced), is fully functional (integrated), and is resilient to change or impact (adaptive), and which has the expected species composition, diversity, and functional organization.
11. **Board** means the Vermont Water Resources Board.
12. **Classification** means the water quality classification designated for a specific body of water in accordance with the provisions of 10 V.S.A. §1253.
13. **csm (cubit feet per second per square mile)** means the streamflow from each square mile of area drained, assuming the runoff is distributed uniformly in time and area.
14. **Designated use** means any value or use, whether presently occurring or not, that is specified in the management objectives for each class of water as set forth in §§3-02(A), 3-03(A), and 3-04(A) of these rules.

15. **Discharge** means the placing, depositing, or emissions of any wastes, directly or indirectly, into an injection well or into waters.
16. **EPA** means the U.S. Environmental Protection Agency.
17. **Existing discharge** means any discharge to the extent authorized by a valid permit issued under the provisions of 10 V.S.A. §1263 or §1265 as of January 7, 1985.
18. **Existing use** means a use which has actually occurred on or after November 28, 1975, in or on waters, whether or not the use is included in the standard for classification of the waters, and whether or not the use is presently occurring.
19. **Full support of uses, or fully support uses** means the achievement of the level of water quality necessary to consistently maintain and protect existing and designated uses.
20. **Functional component** of the aquatic ecosystem means a portion of the aquatic biological community identified by its role in the processing of energy within the aquatic ecosystem (e.g., primary producers, predators, detritivores, etc.).
21. **Groundwater** means water below the land surface.
22. **Indirect discharge** means any discharge to groundwater, whether subsurface, land-based or otherwise.
23. **Intolerant aquatic organisms** means those organisms which are particularly sensitive to, and likely to be adversely affected by, the stress of pollution, flow modification or habitat alteration (e.g., mayflies and stoneflies).
24. **Low median monthly flow** means the median monthly flow for that month having the lowest median monthly flow.
25. **Mean daily flow** means the arithmetic mean of the sum of individual flow values measured over a calendar day which is representative of the total flow over that 24-hour period.
26. **Median monthly flow** means, for a given calendar month, the mean daily flow that is equaled or exceeded 50 percent of the time, based on a long-term record.
27. **Median annual flow** means that mean daily flow which is equaled or exceeded 50 percent of the time.
28. **Mixing zone** means a length or area within the waters of the state required for the dispersion and dilution of waste discharges adequately treated to meet federal and state treatment requirements and within which it is recognized that specific water uses or water quality criteria associated with the assigned classification for such waters may not be realized. A mixing zone shall not extend more than 200 feet from the point of discharge.
29. **Natural condition** means the condition representing chemical, physical, and biological characteristics that occur naturally with only minimal effects from human influences.
30. **Natural flow regime** means a water's characteristic variability in flow rates and water levels, annually, seasonally, and daily, without the influence of artificial flow regulation.
31. **New discharge** means any discharge not authorized under the provisions of 10 V.S.A. §1263 as of January 7, 1985 or any increased pollutant loading or demand on the assimilative

- capacity of the receiving waters from an existing discharge that requires the issuance of a new or amended permit.
32. **Nonpoint source waste** means waste that reaches waters in a diffuse manner from any source other than a point source including, but not limited to, overland runoff from construction sites, or as a result of agricultural or silvicultural practices.
 33. **Nonpolluting waste** means waste that prior to treatment does not have the potential to impair the condition of waters.
 34. **Permit** means a certification, dam order, or other authorization in which during the application review process, compliance with the Vermont Water Quality Standards is evaluated pursuant to applicable state or federal law.
 35. **Point Source** means any discernable, 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, vessel or other floating craft from which either a pollutant or waste is or may be discharged.
 36. **Public Interest** means that which shall be for the greatest benefit to the people of the state as determined by the Secretary in accordance with the criteria set forth in subsection (e) of §1253 of the Act.
 37. **Publicly owned treatment works** means any device or system used in the storage, treatment, disposal or recycling of wastes that is owned by any governmental unit.
 38. **Receiving waters** means all waters adjacent to a discharge, and all downstream or other waters the quality of which may be affected by that discharge.
 39. **Reference condition** means the range of chemical, physical, and biological characteristics of waters minimally affected by human influences. In the context of an evaluation of biological indices, or where necessary to perform other evaluations of water quality, the reference condition establishes attainable chemical, physical, and biological conditions for specific water body types against which the condition of waters of similar water body type is evaluated.
 40. **Riparian vegetation** means the vegetation adjacent to surface waters.
 41. **Riverine impoundment** means a reach of river or stream subject to the backwater influence of a human-made dam with the water remaining generally within the natural channel.
 42. **Seven day low flow, ten year return period (7Q10)** means a drought flow equal to the lowest mean flow for seven consecutive days, adjusted to nullify any effects of artificial flow regulation, that has a 10% chance of occurring in any given year.
 43. **Secretary** means the Secretary of the Agency of Natural Resources or the Secretary's duly authorized representative.
 44. **Taxonomic component of the aquatic ecosystem** means a portion of the biological community identified by a hierarchical classification system for identifying biological organisms that uses physical and biological characteristics (e.g., Insecta: Plecoptera: Perlidae: Agnetina capitata).

45. **Tolerant aquatic organisms** means organisms (e.g., midges and annelids) that, although they may be affected by the stress of pollution, flow modification or habitat alteration, are less sensitive and less likely to be adversely affected than are intolerant aquatic organisms.
46. **Toxic wastes** means those wastes combinations of wastes which, after discharge and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of available information cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological or reproductive malfunctions or physical deformations in such organisms or their offspring.
47. **Waste** means effluent, sewage, or any substance or material, liquid, gaseous, solid or radioactive, including heated liquids, whether or not harmful or deleterious to waters; provided however, the term “sewage” as used in 10 V.S.A. Chapter 47 shall not include the rinse or process water from a cheese manufacturing process.
48. **Waste Management Zone** means a specific reach of Class B waters designated by a permit to accept the discharge of properly treated wastes that prior to treatment contained organisms pathogenic to human beings. Throughout the receiving waters, water quality criteria must be achieved, but increased health risks exist in a waste management zone due to the authorized discharge.
49. **Waters** include all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs and all bodies of surface waters, artificial or natural, which are contained within, flow through or border upon the State or any portion of it.

Section 1-02 General Policy

These rules are intended to achieve the goals of the Vermont Water Quality Policy set forth below, as well as the objective of the federal Clean Water Act (33 U.S.C. §1251 et seq.) which is to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.

A. Water Quality Policy (See 10 V.S.A. §1250)

It is the policy of the State of Vermont to:

1. protect and enhance the quality, character and usefulness of its surface waters and to assure the public health;
2. maintain the purity of drinking water;
3. control the discharge of wastes to waters, prevent degradation of high quality waters and prevent, abate or control all activities harmful to water quality;
4. assure the maintenance of water quality necessary to sustain existing aquatic communities;
5. provide clear, consistent and enforceable standards for the permitting and management of discharges;
6. protect from risk and preserve in their natural state certain high quality waters including fragile high-altitude waters, and the ecosystems they sustain;

7. manage waters to promote a healthy and prosperous agricultural community, to increase the opportunities for use of the state's forest, parks and recreational facilities, and to allow beneficial and environmentally sound development.

It is further the policy of the state to seek over the long term to upgrade the quality of waters and to reduce existing risks to water quality.

B. Water Conservation Policy

Water is a natural resource that should be managed efficiently to reduce waste through promotion of water conservation. It shall be the policy of the state to conserve the water resources of Vermont through technology, methods, and procedures designed to promote efficient use of water; to consider water conservation in all water use decisions; and to reduce or minimize the waste of water through water supply management practices.

C. Riparian Policy

The State of Vermont recognizes the importance of conserving riparian vegetation adjacent to surface waters to provide benefits that include but are not limited to: a) shading of surface water to maintain cooler summer temperatures; b) reducing soil loss, streambank and shoreline erosion, and sedimentation of aquatic habitat; c) filtering sediment, nutrients, and pollutants in runoff; and d) providing cover habitat for aquatic biota.

D. Basin Planning

1. The Secretary is required to adopt basin plans. Such plans inventory the existing and potential causes and sources of pollution that may impair the waters. Basin plans establish a strategy to improve or restore waters, and to ensure full support of uses. Basin plans serve as the guide, consistent with applicable state and federal law, for how various sources of pollution within each basin will be managed in order to achieve compliance with the Vermont Water Quality Standards and the Vermont water quality policy. The Secretary is required by state law to revise all 15 basin plans by January 1, 2000 and to complete at least one basin plan per year beginning in 1992. Basin plans shall be updated every five years.
2. As part of the basin planning process, public participation shall be sought to identify and inventory problems, solutions, high quality waters, existing uses, other water uses, and significant resources of high public interest.
3. In preparing basin plans, the Secretary shall, to the extent required by applicable law, consider all relevant aspects of approved municipal plans and regional plans adopted under 24 V.S.A. Chapter 117 and coordinate and cooperate with the Secretary of the Agency of Agriculture, Food, and Markets as provided for in 6 V.S.A. Chapter 215.
4. Each basin plan shall identify strategies, where necessary, by which to allocate levels of pollution between various sources as well as between individual discharges. Basin plans should, to the extent appropriate, contain specific recommendations by the Secretary that include but are not limited to

the identification of all known existing uses, salmonid spawning or nursery areas important to the establishment or maintenance of such fisheries, reference conditions appropriate for specific waters, any recommended changes in classification and designation of waters, schedules and funding or remediation, stormwater management, riparian zone management, and other measures or strategies pertaining to the enhancement and maintenance of the quality of waters within the basin.

5. In basins that include Class B waters which have not been allocated into one or more Water Management Types pursuant to § 3-06 of these rules, the basin plan shall propose the appropriate Water Management Type or Types based on both the existing water quality and reasonably attainable and desired water quality management goals.
6. Upon adoption of a basin plan, the Secretary shall promptly initiate rulemaking and shall give due consideration to the recommendations contained in the basin plan.

E. Hydrology Policy

1. The proper management of water resources now and for the future requires careful consideration of the interruption of the natural flow regime and the fluctuation of water levels resulting from the construction of new, and the operation of existing, dams, diversions, and other control structures. These rules, in conjunction with other applicable law, provide a means for determining conditions which preserve, to the extent practicable, the natural flow regime of waters.
2. When determining necessary streamflows or conditions necessary to further the goals of this policy through application of the applicable Agency of Natural Resources procedures or regulations, the Secretary, as provided for in 10 V.S.A. §1003, may cooperate with appropriate federal, state, municipal, and private interests in achieving voluntary agreements relating to artificial streamflow regulation that assure consistency with these rules.

F. Classification of Waters

Existing classifications of waters shall be maintained unless reclassified in a manner consistent with the Act and in compliance with all applicable federal requirements including 40 C.F.R. §131.10 (g).

Section 1-03 Anti-Degradation Policy

A. General Policy

All waters shall be managed in accordance with these rules to protect, maintain, and improve water quality.

B. Determination of Existing Uses

1. General

Existing uses of waters and the level of water quality necessary to protect those existing uses shall be maintained and protected regardless of the water's classification. Determinations of what constitute existing uses of particular waters shall be made either during the basin planning process or on a case-by-case basis during consideration of an application. The use of waters to receive or transport discharges of waste shall not constitute an existing use for purposes of these rules. In making a determination of the existing uses to be protected and maintained under this section and all other sections of these rules, the Secretary shall consider at least the following factors:

- a. Aquatic biota and wildlife that utilize or are present in the waters;
- b. Habitat that supports existing aquatic biota, wildlife, or plant life;
- c. The use of the waters for recreation or fishing;
- d. The use of the water for water supply, or commercial activity that depends directly on the preservation of an existing high level of water quality; and
- e. with regarding to the factors considered under paragraphs (a) and (b) above, evidence of the use's ecological significance in the functioning of the ecosystem or evidence of the use's rarity.

C. Protection and Maintenance of High Quality Waters

1. Waters the existing quality of which exceeds any applicable water quality criteria provide important environmental, economic, social and other benefits to the people of the state. Except as provided in subsection 2 of this part, such waters shall be managed to maintain and protect the higher water quality and minimize risk to existing and designated uses. In all cases, the level of water quality necessary to maintain and protect all existing uses as well as applicable water quality criteria shall be maintained.
2. A limited reduction in the existing higher quality of such waters may be allowed only when it is shown that:
 - a. the adverse economic or social impacts on the people of the state specifically resulting from the maintenance of the higher quality of the waters would be substantial and widespread;
 - b. these adverse impacts would exceed the environmental, economic, social, and other benefits of maintaining the higher water quality; and
 - c. there shall be achieved the highest statutory and regulatory requirements for all new or existing point sources, and all cost effective and reasonable accepted agricultural practices and best management practices, as appropriate for nonpoint source control, consistent with state law.

3. To the extent any reduction in the quality of high quality waters is allowed, such reduction shall be limited to that which is necessary to comply with subsections C(2) above.

D. Protection of Outstanding Resource Waters

The Secretary may under 10 V.S.A. §1424a designate certain waters as Outstanding Resource Waters. Where the Secretary so designates such waters because of their water quality values, their existing quality shall, at a minimum, be protected and maintained.

Section 1-04 Discharge Policy

A. Discharge Criteria

In addition to the other provisions of these rules, new discharges of wastes may be allowed only when all the following criteria are met:

1. The proposed discharge is in conformance with all applicable provisions of these rules including the classification of the receiving waters adopted by the Secretary as set forth in Chapter 4 of these rules.
2. There is neither an alternative method of waste disposal, nor an alternative location for waste disposal, that would have a lesser impact on water quality including the quality of groundwater, or if there is such an alternative method or location, it would be clearly unreasonable to require its use.
3. The design and operation of any waste treatment or disposal facility is adequate and sufficiently reliable to ensure the full support of uses and to ensure compliance with these rules and with all applicable state and federal treatment requirements and effluent limitations.
4. Except as provided for in 10 V.S.A. §1259(d) and (f), the discharge of wastes other than nonpolluting wastes and stormwater runoff is prohibited in Class A waters regardless of the degree of treatment provided.
5. Except as provided for in 10 V.S.A. §1259, the discharge of wastes that, prior to treatment, contained organisms pathogenic to human beings into waters is prohibited.
6. The receiving waters will have sufficient assimilative capacity to accommodate the proposed discharge.
7. Assimilative capacity has been allocated to the proposed discharge consistent with the classification set forth in Chapter 4 of these rules.
8. The discharge of wastes to the thermocline or hypolimnion of any lake in manner that may prevent the full support of uses is prohibited.
9. The discharge of sewage into Class B waters shall not pose more than a negligible risk to public health. Compliance with this criterion shall include an assessment of both the level and reliability of treatment achieved and the impact of the discharge on the water quality of the receiving waters.

B. Assimilative Capacity

The capacity of waters to assimilate both the discharge of wastes and the impact of other activities that may adversely affect water quality, and at the same time to be maintained at a level of water quality that is compatible with their classification, is finite. The Secretary may hold a portion of the assimilative capacity in reserve to provide for future needs, including the abatement of future sources of pollution and future social and economic development.

Accordingly, the assimilative capacity of waters shall be carefully allocated in accordance with the “Wasteload Allocation Process” as adopted by the Secretary.

C. Compliance Schedules

A permit issued pursuant to Vermont’s federally-delegated National Pollutant Discharge Elimination System (NPDES) program may, when appropriate, specify a schedule leading to compliance with the Vermont and Federal Clean Water Acts and regulations. The purpose of a schedule of compliance generally is to afford a permittee adequate time to comply with one or more permit requirements or limitations that are based on new, newly interpreted or revised water quality standards that became effective after both issuance of the initial permit for a discharge and July 1, 1977. For a permit requirement or limitation that is based on such a new, newly interpreted, or revised water quality standard, the Secretary may include a schedule of compliance in a permit at the time of permit reissuance or modification where the permittee either cannot comply with the permit requirement or limitation, or there is insufficient information available to determine whether the permittee can comply with the permit requirement or limitation. A schedule of compliance shall require compliance at the earliest possible time, as determined by the Secretary. A schedule of compliance shall include dates for specified tasks or activities leading to compliance and may include interim effluent limitations, as the Secretary deems appropriate. This provision does not limit the Secretary’s authority to include compliance schedules in permits as provided by state law.

Section 1-05 Interpretation

The Secretary may issue declaratory rulings regarding the water quality standards pursuant to 10 V.S.A. §1252 (f).

Chapter 2 APPLICATION OF STANDARDS

Section 2-01 Sampling and Analysis

All numeric water quality criteria shall be applied by rounding to the nearest significant number in accordance with standard mathematic practice. For the purposes of these rules, sample collection, preservation, handling and analysis shall conform as closely as practicable to methods established in the most current edition or publication of any of the following sources:

- (a) “Standard Methods For the Examination of Water and Wastewaters,” Public Health Association, New York.

- (b) “American Society for Testing and Materials,” part 23, “Water; Atmospheric Analysis,” American Society for Testing and Materials.
- (c) “Methods for Chemical Analysis of Water and Wastes,” U.S. Environmental Protection Agency.
- (d) “Microbiological Methods for Monitoring the Environment - Water and Wastes,” U.S. Environmental Protection Agency.
- (e) The “Quality Assurance Program and Project Plan” prepared by the Secretary and as approved by EPA.
- (f) Any applicable practice or procedure adopted by the Secretary under the provisions of 3 V.S.A. §835 or any rule adopted as part of the “Vermont Water Pollution Control Permit Regulations” under the provisions of 3 V.S.A. §836.
- (g) Any applicable practices or procedures adopted by the Secretary for conducting nonpoint source pollution monitoring. Such procedures shall be adopted after public notice and comment. Until such procedures are adopted, nonpoint source pollution monitoring shall be conducted in accordance with generally accepted scientific monitoring or evaluation methodologies which the Secretary determines to be appropriate.

Section 2-02 ***Flow Values Used to Evaluate Compliance with Applicable Numeric Criteria for Rivers, Streams, Brooks, Creeks, and Riverine Impoundments***

A. Natural Flow Regime

Where the natural flow regime is not altered or substantially influenced by any human-made structure or device, compliance with the applicable numeric water quality criteria shall be calculated on the basis of the 7Q10 flow value unless an alternate flow statistic is specified in Section 3-01 of these rules. This rule shall not be construed to allow less than normal design operation of any treatment facility during periods of low streamflow or to otherwise waive the terms of any permit.

B. Natural Flow Regime Altered by Human-made Structures

1. Where there is a Minimum Flow Agreement/Requirement

For waters where the natural flow regime is altered by a human-made structure and where a minimum flow agreement or requirement has been established under 10 V.S.A. §1003, compliance with the applicable numeric water quality criteria shall be calculated on the basis of the 7Q10 flow value or at the agreed/required minimum flow, whichever is less, unless an alternative flow statistic is specified in Section 3-01 of these rules.

2. Where there is No Minimum Flow Agreement/Requirement

For waters where the natural flow regime is altered by human-made structures and where no minimum flow agreement or requirement has been established, compliance with the applicable numeric water quality criteria shall be calculated on the basis of the 7Q10 flow value or at the absolute low

flow resulting from flow regulation, whichever is less, unless an alternative flow statistic is specified in Section 3-01 of these rules.

Section 2-03 ***Nonpoint Source Pollution***

A. Policy

1. It is the policy of the State of Vermont to recognize that certain wastes from nonpoint sources, including but not limited to nonpoint source waste from agricultural or silvicultural practices, are of such a nature that strategies required by the Act or by 6 V.S.A. Chapter 215, and those strategies developed in the basin planning process, represent a practicable basis for achieving compliance with these rules.
2. In implementing Section 2-03 (A), the Secretary and the Secretary of the Agency of Agriculture, Food and Markets are encouraged to exercise the full range of discretion authorized by the Act and 6 V.S.A. Chapter 215 and to manage discharges of nonpoint source waste in as cost-effective a manner as possible consistent with the provisions of these rules.

B. Use of Management Practices and Planning

1. The requirements of these rules for any activity causing a nonpoint source discharge shall be presumed to be satisfied when the activity:
 - (a) Is conducted in accordance with the Accepted Agricultural Practice Rules (6 V.S.A. Chapter 215) or, where required, agricultural best management practices; the Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont; or is conducted in accordance with a best management practice (BMP) for nonpoint source wastes when the best management practice has been adopted as a rule or procedure by the Secretary after public notice and the opportunity for public comment.
 - (b) Is consistent with the strategy for managing nonpoint source wastes within any applicable basin plan.
2. Any presumption provided by this section shall be negated when a water quality analysis conducted according to Section 2-01(g) of these rules demonstrates that there is a violation of these rules.

Section 2-04 ***Special Zones***

A. Mixing Zones

1. Designation

Mixing zones shall not be created in any Class A water. In Class B waters the Secretary may, in conjunction with the issuance of a permit, designate a specific portion of the receiving waters not exceeding 200 feet from the point of discharge as a mixing zone for any waste that has been properly treated to comply with all applicable state and federal

treatment requirements and effluent limitations. Within any mixing zone the Secretary may, in accordance with the terms of a permit, waive specific provisions of §§ 1-03, 3-01, and 3-04(B) when consistent with the criteria in § 2-04(A)(2) of these rules, provided that the quality of the waters outside of the mixing zone complies with all applicable provisions of these rules.

2. *Mixing Zone Criteria*

The Secretary shall insure that conditions due to discharges of waste within any mixing zone shall:

- a. Not result in a significant increase in public health risk when evaluated using reasonable assumptions about exposure pathways;
- b. Not constitute a barrier to the passage or movement of fish or prevent the full support of aquatic biota, wildlife, and aquatic habitat uses in the receiving waters outside the mixing zone;
- c. Not kill organisms passing through the mixing zone;
- d. Protect and maintain the existing uses of the waters;
- e. Be free from materials in concentrations that settle to form objectionable deposits;
- f. Be free from floating debris, oil, scum, and other material in concentrations that form nuisances;
- g. Be free from substances in concentrations that produce objectionable color, odor, taste, or turbidity; and
- h. Be free from substances in concentrations that produce undesirable aquatic life or result in a dominance of nuisance species.

B. *Waste Management Zones*

1. *Designation*

The designation of waste management zones is provided for in 10 V.S.A. §1252(b)-(d). In Class B waters the Secretary may, in conjunction with the issuance of a permit for the direct discharge of properly treated wastes that prior to treatment contained organisms pathogenic to human beings, designate a specific portion of the receiving waters as a waste management zone when the criteria in subsection 2 of this section are met. Waste management zones shall not be created in any Class A water. Within such zones, all water quality criteria shall be met.

2. *Waste Management Zone Criteria*

The Secretary shall insure that, in addition to complying with all other applicable provisions of the statute and these rules, any waste management zone meets the following criteria:

- a. It shall be the minimum length necessary to accommodate the authorized discharge;

- b. It shall be consistent with the anti-degradation policy (Section 1-03) of these rules;
- c. It shall not result in significantly increased health risks when evaluated using reasonable assumptions about exposure pathways;
- d. It will be located and managed so as to not result in more than a negligible increased risk to public health adjacent to or downstream of the waste management zone; and
- e. It will not constitute a barrier to the passage or movement of fish or prevent the full support of aquatic biota, wildlife, and aquatic habitat uses.

Section 2-05 *Public Water Supply*

A. *Designation*

In accordance with 10 V.S.A. §1252, waters that are managed for the purpose of public water supplies may be designated in Chapter 4 as Class A(2) Public Water Supplies.

B. *Public Water Supply Management*

In accordance with 10 V.S.A. §1250, it is the policy of the State of Vermont that public water supplies shall be managed in a manner that assures compliance with these rules. The Secretary is encouraged to exercise the full range of discretion consistent with 10 V.S.A., Chapters 47 and 56 to manage public water supplies to achieve such compliance.

Chapter 3 **DETERMINATION OF CRITERIA**

Section 3-01 *Water Quality Criteria and Indices - General*

A. *Natural Influences*

Waters in which one or more applicable water quality criteria are not met due to natural influences shall not be considered to be in noncompliance with respect to such criteria. In such waters, activities may be specifically authorized by a permit, provided that those activities do not further reduce the quality of the receiving waters and would comply with all other applicable criteria.

B. *General Criteria*

The following water quality criteria shall be achieved in all waters, regardless of their classification:

1. *Temperature*

a. General

The change or rate of change in temperature, either upward or downward, shall be controlled to ensure full support of aquatic biota, wildlife, and aquatic habitat uses. For the purpose of applying this criterion, ambient temperature shall mean the water temperature measured at a control point determined by the Secretary to be outside the influence of a discharge or activity.

b. Cold Water Fish Habitat

The total increase from the ambient temperature due to all discharges and activities shall not exceed 1.0°F except as provided for in paragraph (d) below.

c. Warm Water Fish Habitat

The total increase from the ambient temperature due to all discharges and activities shall not exceed the temperature criteria derived from tables 1 or 2 except as provided for in paragraph (d) below:

Table 1. Lakes, Ponds, and Reservoirs not including Riverine impoundments.

Ambient temperature	Total allowable increase above ambient temperature
Above 60 ⁰	1 ⁰ F
50 ⁰ F - 60 ⁰ F	2 ⁰ F
Below 50 ⁰ F	3 ⁰ F

Table 2. All Other Waters.

Ambient temperature	Total allowable increase above ambient temperature
Above 66 ⁰ F	1 ⁰ F
63 ⁰ to 66 ⁰ F	2 ⁰ F
59 ⁰ to 62 ⁰ F	3 ⁰ F
55 ⁰ to 58 ⁰ F	4 ⁰ F
Below 55 ⁰ F	5 ⁰ F

d. Assimilation of Thermal Wastes

The Secretary may, by permit condition, specify temperature limits that exceed the values specified above in order to authorize discharges of thermal wastes when it is shown that:

- (1) The discharge will comply with all other applicable provisions of these rules;
- (2) A mixing zone of 200 feet in length is not adequate to provide for assimilation of the thermal waste; and
- (3) After taking into account the interaction of thermal effects and other wastes, that change or rate of change in temperature will not result in thermal shock or prevent the full support of uses of the receiving waters.

2. ***Phosphorus***

a. All waters - general policy

In all waters, total phosphorous loadings shall be limited so that they will not contribute to the acceleration of eutrophication or the stimulation of the growth of aquatic biota in a manner that prevents the full support of uses.

b. Lakes, ponds, or reservoirs that have drainage areas of less than 40 square miles and a drainage area to surface area ratio of less than 500:1, and their tributaries.

- (1) In addition to compliance with the general policy above, there shall be no significant increase over currently permitted phosphorus loadings. Discharges to tributaries shall not increase in-stream conditions by more than 0.001 mg/l at low median monthly flow. Indirect discharges to lakes, ponds, or reservoirs shall not increase total dissolved phosphorus as measured in the groundwater 100 feet from the mean water level of the lake, pond, or reservoir by more than 0.001 mg/l.
- (2) Applicable basin plans, other applicable plans, permit limitations, and other measures adopted or approved by the Secretary, may define “no significant increase” so as to allow new or increased discharges of phosphorus, only when the permit for such discharges provides for a corresponding reduction in phosphorus loadings to the receiving waters in question.

3. ***Nitrates***

a. General Policy

In all waters nitrates shall be limited so that they will not contribute to the acceleration of eutrophication, or the stimulation of the growth of aquatic biota, in a manner that prevents the full support of uses.

b. Lakes, Ponds and Reservoirs not including Riverine Impoundments

Not to exceed 5.0 mg/l as NO₃-N regardless of classification.

c. All Other Waters

- (1) Not to exceed 0.20 mg/l, as nitrate-nitrogen (NO₃-N) at flows exceeding low median monthly flows, in Class A(1) and A(2) waters above 2,500 feet altitude, National Geodetic Vertical Datum.
- (2) Not to exceed 2.0 mg/l as NO₃-N at flows exceeding low median monthly flows, in Class A(1) and A(2) waters at or below 2,500 feet altitude, National Geodetic Vertical Datum.
- (3) Not to exceed 5.0 mg/l as NO₃-N at flows exceeding low median monthly flows, in Class B waters.

4. *Sludge deposits or solid refuse*

None

5. *Settleable solids, floating solids, oil, grease, scum, or total suspended solids*

None in such concentrations or combinations that would prevent the full support of uses.

6. *Taste and Odor*

None that would prevent the full support of any designated uses or existing use or have an adverse effect on the taste or odor of fish.

7. *Color*

None that would prevent the full support of uses.

8. *Alkalinity*

No change from reference conditions that would prevent the full support of the aquatic biota, wildlife, and aquatic habitat uses.

9. *pH*

pH values shall be maintained within the range of 6.5 and 8.5. Both the change and the rate of change in pH values shall be controlled to ensure the full support of the aquatic biota, wildlife, and aquatic habitat uses.

10. *Toxic substances*

a. General

Where necessary to fully support uses an existing or designated use, waters shall be managed to prevent the discharge of toxic substances in concentrations, quantities or combinations that exceed:

- (1) For toxic substances that are carcinogenic, a maximum individual lifetime risk to human health greater than 10⁻⁶;
- (2) For toxic substances that are noncarcinogenic, a maximum individual life time risk of no adverse effect to human health; or
- (3) Acute or chronic toxicity to aquatic biota or wildlife.

b. Human health based criteria

In rivers, streams, brooks, creeks, and riverine impoundments, the human health based toxic pollutant criteria listed in Appendix C shall be applied at the median annual flow for toxic substances that are classified as known, probable, or possible human carcinogens or at the 7Q10 flow for toxic substances that are classified as threshold toxicants (not known or probable carcinogens). In all other waters, the human health based toxic pollutant criteria listed in Appendix C shall apply at all times.

c. Aquatic biota based criteria

In rivers, streams, brooks, creeks, and riverine impoundments, the aquatic biota based toxic pollutants criteria that prevent acute or chronic toxicity listed in Appendix C shall be applied at 7Q10 flows. In all other waters, the aquatic biota based toxic pollutant criteria for acute or chronic toxicity listed in Appendix C shall apply at all times.

d. Other toxic substances

Where numeric criteria for a toxic substance are not established by these rules, the Secretary may establish such criteria consistent with general policy in subsection 10(a.) above, based on the procedures set forth in the Vermont Toxic Discharge Control Strategy (1994).

In establishing such limits the Secretary shall give consideration to the potential for bio-accumulation as well as any antagonistic or synergistic relationship that may exist between the wastes being discharged and the concentration of other wastes or constituents in the receiving waters.

In implementing these criteria, the Secretary should consider the full range of discretion authorized by the Act and apply these criteria in as cost effective a manner as possible consistent with the provisions of this subsection.

11. Radioactive Substances

Waters shall be managed so as to prevent the discharge of radioactive substances in concentrations, quantities or combinations that may create a significant likelihood of an adverse impact on human health or a risk of acute or chronic toxicity of aquatic biota or wildlife. Unless otherwise required by these rules, the Secretary shall determine limits for discharges containing radioactive substances based on the results of biological toxicity assessments and the appropriate available scientific data, including but not limited to:

- a. The Vermont State Health Regulation, Part 5, Chapter 3 “Radiological Health,” effective as of 12/10/77
- b. 10 CFR 50, Appendix I

The discharge of radioactive substances shall not exceed the lowest limits which are reasonably achievable.

C. Hydrology Criteria

In order to effectively implement the water conservation and hydrology policies set forth in Section 1-02(E) of these rules, and to ensure full support of uses, the following hydrology criteria shall be achieved and maintained where applicable. Where there are multiple activities that affect flow in a basin, a determination of compliance with the following criteria shall include consideration of the cumulative effects of these activities.

1. *Streamflow Protection*

- a. Class A(1) Waters - Changes from the natural flow regime shall not cause the natural flow regime to be diminished, in aggregate, by more than 5% of 7Q10 at any time;
- b. Class B WMT 1 Waters - Changes from the natural flow regime, in aggregate, shall not result in natural flows being diminished by more than a minimal amount provided that all uses are fully supported; and when flows are equal to or less than 7Q10, by not more than 5% of 7Q10.
- c. Class A(2) Waters and Class B Waters other than WMT1 - Any change from the natural flow regime shall provide for maintenance of flow characteristics that ensure the full support of uses and comply with the applicable water quality criteria. The preferred method for ensuring compliance with this subsection is a site-specific flow study or studies. In the absence of site specific studies, the Secretary may establish hydrologic standards and impose additional hydrologic constraints, consistent with any applicable Agency of Natural Resources rule or procedure, to ensure compliance with the requirements of this subsection.

2. *Flow Study Requirements*

- a. Parameters for study-based, site specific streamflow protection requirements:

Site specific studies shall be sufficiently based on scientific knowledge so that the study will aid in the Secretary's consideration of appropriate site-specific flow criteria. In the case of aquatic habitat studies, those methodologies that are acceptable for determining streamflow protection requirements pursuant to this section include the Instream Flow Incremental Methodology (IFIM), as well as other comparable methods of evaluation deemed appropriate by the Secretary, provided that such evaluation complies with each of the following requirements:

 - (1) the methodology is tailored to provide information from which to determine the relationship between aquatic habitat and streamflow;
 - (2) the methodology, or the scientific evaluations upon which it is based, have been subjected to peer review and evaluation, and the results of such peer review and evaluation support the conclusion that the methodology is generally acceptable.
- b. When considering proposals for developing site-specific flow criteria in conjunction with review of an application, the Secretary may first require the filing of a study plan that defines the method to be used and provides any

study details that the Secretary deems necessary, and, in the case of a study designed to evaluate the relationship between aquatic habitat and streamflow, the Secretary shall make a ruling as to the acceptability of the methodology. The Secretary need not consider any flow study unless the study plans have obtained the Secretary's approval. The plan may include Agency of Natural Resources oversight during study execution and study refinement and modification as the study proceeds. The Secretary should also establish a procedure by which completeness of the evidence in support of the proposed study based flow could be determined prior to the Secretary's determination on the application. If the proposal is determined to be incomplete, or if the methodology which is employed is unacceptable to the Secretary, the Secretary shall issue a written request for the submission of additional evidence, with general instructions to the applicant as to the deficiency of the evidence previously submitted.

3. *Water Level Fluctuations*

- a. Class A(1)/Class B WMT 1 Waters - Manipulation of the water level of lakes, ponds, reservoirs, riverine impoundments, and any other waters shall result in no more than a minimal deviation from the natural flow regime.
- b. Class A(2) Class B WMT 2/Class B WMT 3 Waters - Lakes, ponds, reservoirs, riverine impoundments, and any other waters may exhibit artificial variations in water level when subject to water level management, but only to the extent that such variations ensure full support of uses.

4. *High Flow Regime*

- a. Class A(1)/Class B WMT 1 Waters - No change from the natural flow regime that would result in more than a minimal impact upon these waters.
- b. Class A(2)/Class B WMT 2/Class B WMT 3 Waters - No change from the natural flow regime that would result in runoff causing an increase in the frequency, magnitude, or duration of peak flows adversely affecting channel integrity or prevent the full support of uses.

D. *Numeric Biological Indices*

1. In addition to other applicable provisions of these rules and other appropriate methods of evaluation, the Secretary may establish and apply numeric biological indices to determine whether there is full support of aquatic biota and aquatic habitat uses. These numeric biological indices shall be derived from measures of the biological integrity of the reference condition for different water body types. In establishing numeric biological indices, the Secretary shall establish procedures that employ standard sampling and analytical methods to characterize the biological integrity of the appropriate reference condition. Characteristic measures of biological integrity include but are not limited to community level measurements such as: species

richness, diversity, relative abundance of tolerant and intolerant species, density, and functional composition.

2. In addition, the Secretary may determine whether there is full support of aquatic biota and aquatic habitat uses through other appropriate methods of evaluation, including habitat assessments.

Section 3-02 *Class A(1) Ecological Waters*

A. Management Objectives

Managed to achieve and maintain waters in a natural condition, compatible with the following designated uses:

1. **Aquatic Biota, Wildlife, and Aquatic Habitat** - consistent with waters in their natural condition.
2. **Aesthetics** - water character, flows, water level, bed and channel characteristics, and flowing and falling waters in their natural condition.
3. **Swimming and Other Primary Contact Recreation** - highest quality in waters, in their natural condition with negligible risk of illness or injury from conditions that are a result of human activities.
4. **Boating, Fishing, and Other Recreational Uses** - highest quality as compatible with waters in their natural condition.

B. Water Quality Criteria for Class A(1) Ecological Waters

The following water quality criteria shall be achieved in all Class A(1) ecological waters.

1. **Turbidity** - None in such amounts or concentrations that would prevent the full support of uses, and not to exceed 10 NTU (nephelometric turbidity units) as an annual average under dry weather base-flow conditions.
2. **Escherichia coli** - Not to exceed a geometric mean of 126 organisms /100ml obtained over a representative period of 60 days, and no more than 10% of samples above 235 organisms/100 ml. None attributable to the discharge of wastes.
3. **Aquatic Biota, Wildlife, and Aquatic Habitat** - Change from the natural condition limited to minimal impacts from human activity. Measures of biological integrity for aquatic macroinvertebrates and fish assemblages are within the range of the natural condition. Uses related to either the physical, chemical, or biological integrity of the aquatic habitat or the composition or life cycle functions of aquatic biota or wildlife are fully supported. All life cycle functions, including overwintering and reproductive requirements are maintained and protected.
4. **Dissolved Oxygen** - as exists in waters in their natural condition.
5. **Nutrients** - Compliance with nutrient criteria for Class A(1) waters shall be achieved either by compliance with the nutrient concentration values in Table 3 or by compliance with all nutrient response conditions in Table 3. In situations where the applicable nutrient concentrations are achieved but the nutrient response conditions

are not met as a result of nutrient enrichment, the Secretary may establish alternate nutrient concentration values on a site-specific basis as necessary to achieve compliance with the nutrient response conditions. All waters shall maintain a level of water quality that provides for the attainment and maintenance of the water quality standards of downstream waters.

Table 3. Nutrient Criteria for Class A(1) Waters.

	<u>Small, High-Gradient Streams¹</u>	<u>Medium, High-Gradient Streams¹</u>	<u>Warm-Water, Medium-Gradient Streams¹</u>	<u>Lakes and Reservoirs²</u>	<u>All Other Waters</u>
<u>Nutrient Concentrations</u>					
Total Phosphorus (µg/L)	10 ³	9 ³	18 ³	12 ⁴	
<u>Nutrient Response Conditions</u>					
Secchi Disk Depth (meters)				5.0 ⁵	
Chlorophyll-a (µg/L)				2.6 ⁴	
pH	Not to exceed 8.5 standard units.				
Turbidity	Consistent with the criteria in Section 3-02 B.1 of these rules.				
Dissolved Oxygen	Consistent with the criteria in Section 3-02 B.4 of these rules.				
Aquatic Biota, Wildlife, and Aquatic Habitat	Consistent with the criteria in Section 3-02 B.3 of these rules, implemented according to the numeric thresholds established in the Vermont Department of Environmental Conservation Biocriteria for Fish and Macroinvertebrate Assemblages in Vermont Wadeable Streams and Rivers - Implementation Phase, dated February 10, 2004 or as more recently updated.				

1. Stream type determinations made by the Secretary for application of numerical biological indices in accordance with Section 3-01 D of these rules shall be used for the application of these nutrient criteria.

2. Applies to lakes and reservoirs greater than 20 acres in surface area with a drainage area to surface area ratio less than 500:1.

3. Not to be exceeded at low median monthly flow during June through October in a section of the stream representative of well-mixed flow.

4. June through September mean not to be exceeded in the photosynthetic depth (euphotic) zone at a central location in the lake.

5. June through September mean not to be less at a central location in the lake.

A. Management Objectives

Water managed for public water supply purposes to achieve and maintain waters with a uniformly excellent character and a level of water quality that is compatible with the following designated uses:

1. **Aquatic Biota, Wildlife, and Aquatic Habitat** - high quality aquatic biota and wildlife sustained by high quality aquatic habitat necessary to support their life-cycle and reproductive requirements.
2. **Aesthetics** - water character, flows, water level, and bed and channel characteristics consistently exhibiting aesthetic value.
3. **Swimming and other primary contact recreation** - in waters that pose negligible risk of illness due to conditions that are a result of human activities, but managed as necessary for consistency with use as a public water supply.
4. **Boating, Fishing, and Other Recreational Uses** - suitable for good quality boating, fishing, and other recreational uses.
5. **Public Water Supplies** - highly suited as a source for public water supply with disinfection, and filtration when necessary.

B. Water Quality Criteria for Class A(2) Public Water Supplies

The following water quality criteria shall be achieved in all Class A(2) public water supplies.

1. **Turbidity** - None in such amounts or concentrations that would prevent the full support of uses, and not to exceed 10 NTU (nephelometric turbidity units) as an annual average under dry weather base-flow conditions.
2. **Escherichia coli** - Not to exceed a geometric mean of 126 organisms /100ml obtained over a representative period of 60 days, and no more than 10% of samples above 235 organisms/100 ml. None attributable to the discharge of wastes.
3. **Aquatic Biota, Wildlife and Aquatic Habitat** - Biological integrity is maintained, no change from the reference condition that would prevent the full support of aquatic biota, wildlife or aquatic habitat uses. Change from the reference condition for aquatic macroinvertebrates and fish assemblages shall not exceed moderate changes in the relative proportions of taxonomic, functional, tolerant and intolerant components. All expected functional groups are present in a high quality habitat and none shall be eliminated. All life cycle functions, including overwintering and reproductive requirements are maintained and protected. Changes in the aquatic habitat shall not exceed moderate differences from the reference condition consistent with full support of all aquatic biota and wildlife uses.
4. **Dissolved Oxygen**

The specified dissolved oxygen criteria for each designated fish habitat type will be considered absolute instantaneous minimum values. In addition, fluctuations

above the minimum values shall be maintained as necessary to support aquatic habitat.

- a. Cold Water Fish Habitat** - Not less than 7 mg/l and 75% saturation at all times, nor less than 95% saturation during late egg maturation and larval development of salmonids in areas that the Secretary determines are salmonid spawning or nursery areas important to the establishment or maintenance of the fishery resource. Not less than 6 mg/l and 70% saturation at all times in all other waters designated as a cold water fish habitat.
 - b. Warm Water Fish Habitat** - Not less than 5 mg/l and 60% saturation at all times.
- 5. Nutrients** - Compliance with nutrient criteria for Class A(2) waters shall be achieved either by compliance with the nutrient concentration values in Table 4 or by compliance with all nutrient response conditions in Table 4. In situations where the applicable nutrient concentrations are achieved but the nutrient response conditions are not met as a result of nutrient enrichment, the Secretary may establish alternate nutrient concentration criteria on a site-specific basis as necessary to achieve compliance with the nutrient response conditions. All waters shall maintain a level of water quality that provides for the attainment and maintenance of the water quality standards of downstream waters.

Table 4. Nutrient Criteria for Class A(2) Waters.

	<u>Small, High- Gradient Streams¹</u>	<u>Medium, High- Gradient Streams¹</u>	<u>Warm- Water, Medium- Gradient Streams¹</u>	<u>Lakes and Reservoirs²</u>	<u>All Other Waters</u>
<u>Nutrient Concentrations</u>					
Total Phosphorus (µg/L)	12 ³	15 ³	27 ³	17 ⁴	
<u>Nutrient Response Conditions</u>					
Secchi Disk Depth (meters)				3.2 ⁵	
Chlorophyll-a (µg/L)				3.8 ⁴	
pH	Not to exceed 8.5 standard units.				
Turbidity	Consistent with the criteria in Section 3-03 B.1 of these rules.				
Dissolved Oxygen	Consistent with the criteria in Section 3-03 B.4 of these rules.				
Aquatic Biota, Wildlife, and Aquatic Habitat	Consistent with the criteria in Section 3-03 B.3 of these rules, implemented according to the numeric thresholds established in the Vermont Department of Environmental Conservation Biocriteria for Fish and Macroinvertebrate Assemblages in Vermont Wadeable Streams and Rivers - Implementation Phase, dated February 10, 2004 or as more recently updated.				

1. Stream type determinations made by the Secretary for application of numerical biological indices in accordance with Section 3-01 D of these rules shall be used for the application of these nutrient criteria.
2. Applies to lakes and reservoirs greater than 20 acres in surface area with a drainage area to surface area ratio less than 500:1.
3. Not to be exceeded at low median monthly flow during June through October in a section of the stream representative of well-mixed flow.
4. June through September mean not to be exceeded in the photosynthetic depth (euphotic) zone at a central location in the lake.
5. June through September mean not to be less at a central location in the lake.

Section 3-04

Class B Waters

A. Management Objectives

Class B waters shall be managed to achieve and maintain a level of quality that fully supports the following designated uses:

1. **Aquatic Biota, Wildlife, and Aquatic Habitat** - aquatic biota and wildlife sustained by high quality aquatic habitat with additional protection in those waters where these uses were sustainable at a higher level based on Water Management Type designation.
2. **Aesthetics** - water character, flows, water level, bed and channel characteristics, exhibiting good aesthetic value and, where attainable, excellent aesthetic value based on Water Management Type designation.
3. **Public water supply** - Suitable for use as a source for a public water supply with filtration and disinfection.
4. **Irrigation of crops and other agricultural uses** - suitable, without treatment, for irrigation of crops used for human consumption without cooking and suitable for other agricultural uses.
5. **Swimming and other primary contact recreation** - suitable for swimming and other forms of water based recreation where sustained direct contact with the water occurs and, where attainable, suitable for these uses at very low risk of illness based on Water Management Type designation.
6. **Boating, fishing and other recreational uses** - Suitable for these uses with additional protection in those waters where these uses are sustainable at a higher level based on Water Management Type designation.

B. Water Quality Criteria for Class B waters

In addition to the criteria specified in §3-01 of these rules, the following criteria shall be met in all Class B waters:

1. **Turbidity** - The following criteria shall be achieved:
 - a. In Cold Water Fish Habitat waters - None in such amounts or concentrations that would prevent the full support of uses, and not to exceed 10 NTU (nephelometric turbidity units) as an annual average under dry weather base-flow conditions; and
 - b. In Warm Water Fish Habitat waters - None in such amounts or concentrations that would prevent the full support of uses, and not to exceed 25 NTU (nephelometric turbidity units) as an annual average under dry weather base-flow conditions.
2. **Dissolved Oxygen** -

The specified dissolved oxygen criteria for each designated fish habitat type will be considered absolute instantaneous minimum values. In addition, fluctuations above the minimum values shall be maintained as necessary to support aquatic habitat.

- a. Cold Water Fish Habitat waters - Not less than 7 mg/l and 75% saturation at all times, nor less than 95% saturation during late egg maturation and larval development of salmonids in areas that the Secretary determines are salmonids spawning or nursery areas important to the establishment or maintenance of the fishery resource. Not less than 6 mg/l and 70% saturation at all times in all other waters designated as a cold water fish habitat, and
- b. Warm Water Fish Habitat waters - Not less than 5 mg/l and 60% saturation at all times.

3. **Escherichia coli** -

In all Class B waters - Not to exceed a geometric mean of 126 organisms /100ml obtained over a representative period of 60 days, and no more than 10% of samples above 235 organisms/100 ml. In waters receiving combined sewer overflows, the representative period shall be 30 days. The Secretary may, by permit condition, waive compliance with this criterion during all or any portion of the period between October 31 and April 1, provided that a health hazard is not created. The Secretary shall provide written notice to the Vermont Department of Health prior to issuing a permit waiving compliance with the Escherichia coli criterion.

4. **Aquatic Biota, Wildlife and Aquatic Habitat** - No change from the reference condition that would prevent the full support of aquatic biota, wildlife, or aquatic habitat uses. Biological integrity is maintained and all expected functional groups are present in a high quality habitat. All life-cycle functions, including overwintering and reproductive requirements are maintained and protected. In addition, the following criteria shall be achieved:

- a. In Water Management Type One waters - change from the reference condition for aquatic macroinvertebrate and fish assemblages shall be limited to minor changes in the relative proportions of taxonomic and functional components; relative proportions of tolerant and intolerant components are within the range of the reference condition. Changes in the aquatic habitat shall be limited to minimal differences from the reference condition consistent with the full support of all aquatic biota and wildlife uses.
- b. In Water Management Type Two waters - change from the reference condition for aquatic macroinvertebrate and fish assemblages shall be limited to moderate changes in the relative proportions of tolerant, intolerant, taxonomic, and functional components. Changes in the aquatic habitat shall be limited to minor differences from the reference condition consistent with the full support of all aquatic biota and wildlife uses.

- c. In Water Management Type Three waters - change from the reference condition for aquatic macroinvertebrate and fish assemblages shall be limited to moderate changes in the relative proportions of tolerant, intolerant, taxonomic, and functional components. Changes in the aquatic habitat shall be limited to moderate differences from the reference condition consistent with the full support of all aquatic biota and wildlife uses. When such habitat changes are a result of hydrological modification or water level fluctuation, compliance may be determined on the basis of aquatic habitat studies.
- d. In all other Class B waters - no change from reference conditions that would have an undue adverse effect on the composition of the aquatic biota, the physical or chemical nature of the substrate or the species composition or propagation of fishes.

5. Nutrients

- a. In all Class B waters except for segments within Lake Champlain and Lake Memphremagog, compliance with nutrient criteria shall be achieved either by compliance with the nutrient concentration values in Table 5 or by compliance with all nutrient response conditions in Table 5. In situations where the applicable nutrient concentrations are achieved but the nutrient response conditions are not met as a result of nutrient enrichment, the Secretary may establish alternate nutrient concentration criteria on a site-specific basis as necessary to achieve compliance with the nutrient response conditions. All waters shall maintain a level of water quality that provides for the attainment and maintenance of the water quality standards of downstream waters.

Table 5. Nutrient Criteria for Class B Waters Other Than Segments Within Lake Champlain and Lake Memphremagog.

	<u>Small, High-Gradient Streams¹</u>	<u>Medium, High-Gradient Streams¹</u>	<u>Warm-Water, Medium-Gradient Streams¹</u>	<u>Lakes and Reservoirs²</u>	<u>All Other Waters</u>
<u>Nutrient Concentrations</u>					
Total Phosphorus (µg/L)	12 ³	15 ³	27 ³	18 ⁴	
<u>Nutrient Response Conditions</u>					
Secchi Disk Depth (meters)				2.6 ⁵	
Chlorophyll-a (µg/L)				7.0 ⁴	
pH	Not to exceed 8.5 standard units.				
Turbidity	Consistent with the criteria in Section 3-04 B.1 of these rules.				
Dissolved Oxygen	Consistent with the criteria in Section 3-04 B.2 of these rules.				
Aquatic Biota, Wildlife, and Aquatic Habitat	Consistent with the criteria in Section 3-03 B.4 of these rules, implemented according to the numeric thresholds established in the Vermont Department of Environmental Conservation Biocriteria for Fish and Macroinvertebrate Assemblages in Vermont Wadeable Streams and Rivers - Implementation Phase, dated February 10, 2004 or as more recently updated.				

1. Stream type determinations made by the Secretary for application of numerical biological indices in accordance with Section 3-01 D of these rules shall be used for the application of these nutrient criteria.
2. Applies to lakes and reservoirs greater than 20 acres in surface area with a drainage area to surface area ratio less than 500:1, excluding Lake Champlain and Lake Memphremagog.
3. Not to be exceeded at low median monthly flow during June through October in a section of the stream representative of well-mixed flow.
4. June through September mean not to be exceeded in the photosynthetic depth (euphotic) zone at a central location in the lake.
5. June through September mean not to be less at a central location in the lake.

b. Lake Champlain and Lake Memphremagog

All discharges into each of the lake segments identified in Table 6, or into tributaries within the basin, shall comply with the applicable Total Maximum Daily Load (TMDL), basin plans, other applicable plans, permit limitations and any other measures adopted or approved by the Secretary reasonably designed to achieve the criteria in Table 6.

Table 6. Phosphorus Criteria for Segments Within Lake Champlain and Lake Memphremagog.

<u>Lake Segment (See Appendix B)</u>		<u>Phosphorus Criterion (mg/L as P)¹</u>
Lake Champlain		
	Main Lake	0.010
	Malletts Bay	0.010
	Burlington Bay	0.014
	Shelburne Bay	0.014
	Northeast Arm	0.014
	Isle LaMotte	0.014
	Otter Creek	0.014
	Port Henry	0.014
	St. Albans Bay	0.017
	Missisquoi Bay	0.025
	South Lake A	0.025
	South Lake B	0.054
Lake Memphremagog		
	Main Lake	0.014
	South Bay	0.025

1. These criteria shall be achieved as the annual mean total phosphorus concentration in the photosynthetic depth (euphotic) zone in central, open water areas of each lake segment.

6. **Aesthetics** - The following criteria shall be achieved:
 - a. In Water Management Type One waters - consistently exhibit excellent aesthetic values;
 - b. In Water Management Type Two waters - consistently exhibit very good aesthetic values;
 - c. In Water Management Type Three waters - seasonal and temporal variability may be allowed provided that good aesthetics value is achieved;
 - d. In all other Class B waters - water of quality that consistently exhibits good aesthetic value.

7. **Boating** - The following criteria shall be achieved:
 - a. In Water Management Type One waters - to the full extent naturally feasible without degradation due to artificial flow and water level management or artificial physical impediments;
 - b. In Water Management Type Two waters - to the extent naturally feasible with no more than minor degradation due to artificial flow and water level management or artificial impediments, and with appropriate mitigation for artificial physical impediments;
 - c. In Water Management Type Three waters - to the extent feasible, and with appropriate mitigation for artificial physical impediments;
 - d. In all other Class B waters - a high level of quality that is compatible with boating.

Section 3-05 Fish Habitat Designation

To provide for the protection and management of fisheries, the waters of the State are designated in Appendix A as being either a cold or a warm water fish habitat. Where appropriate, such designations may be seasonal.

Section 3-06 Water Management Types

A. Purpose

To provide for the protection and management of Class B waters in a manner that more explicitly recognizes their attainable uses and the level of water quality protection already afforded under the anti-degradation policy (see § 1-03 of these rules), all Class B waters shall eventually be designated as being either Water Management Type 1, Type 2 or Type 3. Such Water Management Type designations shall be made by amending these rules in accordance with the provisions of applicable law and the provisions of subsection B below. Until waters are designated as a specific Water Management Type, the criteria based on such designations shall not apply.

B. Water Management Type Designation Process

The **Secretary** may increase or decrease the level of protection for a designated use in Class B Waters only when it is shown that:

1. the current level of protection is not in the public interest after giving due consideration to the provisions of 10 V.S.A. §1253(e);
2. the proposed level of protection is appropriate after consideration of any recommendations of any Basin plan that pertains to the waters in question; and
3. the proposed level of protection is in compliance with all applicable federal requirements, including 40 CFR Section 131.10(g).

Chapter 4 WATER QUALITY CLASSIFICATIONS

The classification of all waters has been established by a combination of legislative acts and by classification or reclassification decisions issued by the Secretary pursuant to 10 V.S.A. §1253. Those waters reclassified by the Secretary to Class A shall include all waters within the entire watershed of the reclassified waters unless expressly provided otherwise in the rule. Watershed shall mean that region which contains waters that drain into a particular brook, stream, river, or other body of water.

Section 4-01. Classification of the Batten Kill Walloomsac and Hoosic Basin (Basin 1)

All waters within this basin are Class B except as provided for below:

A. Batten Kill

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Acres</u>
An unnamed tributary to Bromley Brook	A2	6/30/64	0.5 mile

Description

Village of Manchester water supply. (No longer used). The first unnamed tributary to Bromley Brook and all waters within its watershed upstream of the Manchester Water Co. intake. The tributary is the first tributary on the right upstream of Bromley Brook’s confluence with Bourn Brook. The intake is approximately 0.5 mile upstream of its juncture with Bromley Brook.

B. Walloomsac River

Basin Brook and Furnace Brook	A2	12/23/52	5.0 miles
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Village of North Bennington water supply. Basin Brook and all waters within its watershed to and including the North Bennington Reservoir in the Towns of Glastenbury and Shaftsbury. (Furnace Brook is not a water supply).

Bolles Brook	A2	7/1/71 ¹	5.3 miles
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Village of Bennington water supply. That portion of Bolles Brook and all waters within its watershed in the Towns of Glastenbury and Woodford upstream of the Bennington water intake.

Sucker Pond (Lake Hancock) & tributaries	A2	12/23/52	70 acres
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Village of Bennington water supply. Lake surface and all waters within its watershed in Stamford.

Barney Brook	A2	7/1/71 ¹	1.3 miles
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Village of Bennington water supply. That portion of Barney Brook and all waters within its watershed in the Town of Woodford upstream of the water intake.

¹ The Water Resources Board did not classify these waters. They are included as a result of the 1949 and 7/1/71 legislation which defined what constituted Class A waters.

Unnamed tributary to South Stream A2 7/1/71¹ 1.0 mile

Village of Bennington water supply. That a portion tributary to South Stream and all waters within its watershed in the Town of Woodford upstream of the water intake in Bennington.

C. Hoosic River

Roaring Branch A2 7/1/71¹ 2.3 miles

Town of Bennington Water supply. That portion of Roaring Branch and all waters within its watershed in the Town of Stamford upstream of the water intake in Pownal.

Unnamed tributaries A2 3/6/59 2.9 miles

Village of Pownal water supply. That portion of unnamed tributaries and their watersheds on Mann Hill in the Town of Pownal upstream of the water intake in Oak Hill Cemetery.

Unnamed tributaries (Reservoir (a) 0.8 miles

Hollow Brook and Ladd Brook)² A2 3/6/59 (b) 1.5 miles

Village of North Pownal water supply. (a) Reservoir Hollow Brook and reservoir and all waters within its watershed. (Reservoir is approx. 0.5 mile upstream of the Hoosic River).

Village of Pownal water supply. (b) Ladd Brook and all waters within its watershed in the Town of Pownal.

D. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified as A(2) above.

A1 5/17/86 No record

² Previously described as "unnamed tributaries" in the 3/6/59 classification proceedings.

Section 4-02. Classification of the Poultney-Mettawee Basin (Basin 2)

All waters within this basin are Class B except as provided for below:

A. Poultney River

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Aces</u>
Inman Pond	A2	6/15/67	79 acres (Pond only)

Description

Village of Fair Haven water supply. Inman Pond and all waters within its watershed in Fair Haven.

Sucker Creek	A2	7/1/71 ¹	0.6 mile
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Village of Fair Haven water supply. Sucker Creek and all waters within its watershed upstream of the Howard Dam and Sheldon Dam, both of which are located in Fair Haven.

B. Entire Basin

All waters located above 2,500 feet altitude National Geodetic Vertical Datum unless specifically classified as A(2) above.

	A1	5/17/86	No record
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Section 4-03. Classification of the Otter Creek Basin (Basin 3)

All waters within this basin are Class B except as provided for below:

A. Upper Otter Creek

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Aces</u>
Unnamed tributary to Cold River	A2	2/17/61	2.0 miles

Description

City of Rutland water supply. Unnamed tributary to Cold River and all waters within its watershed upstream of its diversion into the Mendon Brook watershed in Sherburne.

Mendon Brook	A2	2/17/61	6.0 miles
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City of Rutland water supply. Mendon Brook and all waters within its watershed upstream of the water intake just south of Meadow Lake Drive in the Town of Mendon.

Tenney Brook	A2	2/17/61	2.0 miles
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Rutland-Mendon Town water supply. Tenney Brook and all waters with its watershed upstream of and including a small intake impoundment.

Rutland City Reservoir	A2	Legis. ¹	No Record
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City of Rutland water supply. Rutland City Reservoir in Rutland Town and all waters within its watershed in Rutland Town and Mendon.

Moon Brook	A2	Legis. ¹	2.0 miles
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Rutland-Mendon F.D. #2 water system. (Gleason Road System - now abandoned.) Moon Brook and all waters within its watershed in Mendon upstream of and including a small intake impoundment.

Unnamed Tributary to Tenney

Brook	A2	Legis. ¹	1.1 miles
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Rutland F.D. #2 (Gleason Road) water system. Unnamed tributary to Tenney Brook and all waters within its watershed in Mendon upstream of the water intake.

Young's Brook	A2	2/17/61	2.0 miles
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Village of West Rutland water supply. (No longer used). Young's Brook and reservoir and all waters within its watershed in West Rutland and Ira upstream of the water intake.

Furnace Brook and Kiln Brook	A2	2/17/61	5.5 miles
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Village of Proctor water supply. (Kiln Brook in the main source, with Furnace Brook used as a backup). Furnace Brook and Kiln Brook and all waters within their watersheds in Chittenden upstream of their confluence.

Sugar Hollow Brook	A2	2/17/61	2.0 miles
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Town of Brandon water supply. (No longer used). Sugar Hollow Brook and all waters within its watershed in Goshen and Chittenden upstream of the water intake.

Leicester Hollow Brook	A2	2/17/61	2.0 miles
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Town of Brandon Water Supply. (No longer used). Leicester Hollow Brook and all waters within its watershed in Leicester upstream of the water intake.

B. Lower Otter Creek

Brandy Brook	A2	11/13/61	1.0 miles
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Now or former water supply for Breadloaf School. Brandy Brook and all waters within its watershed.

Unnamed tributary to Beaver Meadow

Brook	A2	11/13/61	1.3 miles
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Village of Bristol water supply. Unnamed tributary to Beaver Meadow Brook and all waters within its watershed upstream of the water intake in Lincoln.

Unnamed tributary to Lewis Creek	A2	7/1/71 ¹	2.0 miles
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Village of Starksboro water supply. (No longer used). Unnamed tributary to Lewis Creek and all waters within its watershed in Starksboro upstream of the water intake.

Two unnamed tributaries to Little			1.6 and
Otter Creek	A2	7/1/71 ¹	1.4 miles

City of Vergennes water supply. (Not used since 1973). Two unnamed tributaries to Little Otter Creek and all waters within their watersheds in Monkton and Bristol upstream of two water intakes.

Notch Brook	A2	11/13/61	2.0 miles
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Village of Middlebury water supply. (Reserved for emergency use). Notch Brook and all waters within its watershed upstream of the water intake in Bristol.

Roaring Brook	A2	7/1/71 ¹	3.3 miles
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Wallingford F.D. #1 water supply. Roaring Brook and all waters within its watershed upstream of the water intake.

C. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum unless specifically classified as A(2) above.

A1	5/17/86	No record
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Section 4.04. *Classification of the Southern Champlain Basin (Basin #4)*

All waters within this basin at or below 2,500 feet altitude National Geodetic Vertical Datum are Class B. All waters within this basin above 2,500 feet altitude, National Geodetic Vertical Datum, are Class A. No other waters are Class A.

Section 4-05. Classification of the Northern Champlain Basin (Basin #5)

All waters within this basin are Class B except as provided for below:

A. Lake Champlain Including Minor Tributaries

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Acres</u>
Milton Pond	A2	3/21/68	20 acres (Pond only)

Description

Village of Milton water supply (No longer used). Milton Pond and all waters within its watershed in Milton.

Indian Brook Reservoir	A2	3/21/68	95 acres (Reservoir only)
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Former Essex Town water supply (No longer used - sold to developer). Indian Brook Reservoir and all waters within its watershed in Essex Town.

Colchester Pond	A2	3/21/68	93 acres (Pond only)
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Village of Colchester water supply. (Not used since 1974, but reserved for emergency use). Colchester Pond and all waters within its watershed in the Town of Colchester.

B. St. Albans Bay

Mill River	A2	6/28/54 ¹	62 acres (Reservoir only)
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City of St. Albans water supply. Two reservoirs which drain to the Mill River and all waters within their watersheds in the Towns of Fairfax, St. Albans, and Fairfield.

C. Entire Basin

All waters located above 2,500 feet altitude National Geodetic Vertical Datum, unless specifically classified

as A(2) above.	A1	5/17/86	No Record
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Section 4.06. Classification of the Missisquoi Basin (Basin 6)

All waters within this basin are Class B except as provided for below:

A. Missisquoi River

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Acres</u>
Mountain Brook	A2	5/28/70	1.6 and 1.1 miles

Description

Village of North Troy water supply. (Reserved for emergency use). Mountain Brook and a tributary and all waters within their watersheds upstream of two separate water intakes in Jay.

Coburn Brook Reservoir and

tributaries	A2	5/28/70	2.0 miles
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Village of North Troy water supply. (Reserved for emergency use). Coburn Brook and Coburn Brook Reservoir in Westfield and all waters within their watersheds upstream of the water intake in Coburn Brook.

Unnamed tributary to Trout River	A2	5/28/70	0.6 mile
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Village of East Berkshire water supply. Unnamed tributary to the Trout River in Enosburg and all waters within its watershed upstream of the water intake.

Hannah Clark Brook	A2	5/28/70	4.0 miles
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Village of Montgomery Ctr. water supply. (Reserved for emergency use). Hannah Clark Brook in Montgomery and all waters in its watershed upstream of the water intake.

Stanhope Brook	A2	5/28/70	5.0 miles
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Village of Richford water supply. Stanhope Brook in Richford and all waters in its watershed upstream of the water intake.

Trout Brook	A2	5/28/70	2.0 miles
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Village of Enosburg Falls water supply. (Reserved for emergency use). Trout Brook in Berkshire and all waters within its watershed upstream of the outlet of Enosburg Reservoir.

Loveland Brook	A2	7/1/71 ¹	2.0 miles
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Village of Richford water supply. Loveland Brook in Richford and all waters within its watershed upstream of the water intake.

Black Falls Brook	A2	7/1/71 ¹	5.0 miles
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Village of Montgomery Ctr. (Reserved for emergency use). Black Falls Brook in Montgomery and Richford and all waters within its watershed upstream of the water intake.

B. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified as A(2) above.

A1 5/17/86 No Record

Section 4-07. Classification of Lamoille Basin (Basin 7)

All waters within this basin are Class B except as provided for below:

A. Lamoille River

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Acres</u>
Smith Brook	A2	7/1/71 ¹	1.6 miles

Description

Village of Johnson water supply. Smith Brook in Johnson and all waters in its watershed upstream of the water intake.

French Hill Brook	A2	7/1/71 ¹	2.4 miles
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Village of Johnson water supply. French Hill Brook in Johnson and all waters in its watershed upstream of the water intake.

Silver Lake	A2	2/13/70 ¹	30 acres (lake only)
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City of St. Albans water supply. Silver Lake and all waters in its watershed in the Towns of Georgia and Fairfax.

Unnamed Tributary to the Lamoille

River	A2	7/1/71 ¹	1.0 mile
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Village of Hardwick water supply. (No longer used). Unnamed tributary to the Lamoille River and all waters in its watershed in Hardwick upstream of the water intake.

Unnamed Tributary to the Lamoille

River	A2	7/1/71 ¹	0.1 mile
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Village of Fairfax water supply. (No longer used). Unnamed tributary to the Lamoille River and all waters in its watershed in Fairfax upstream of the water intake.

B. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified as A(2) above.

A1 5/27/86 No record

Section 4-08. Classification of the Winooski Basin (Basin 8)

All waters within this basin are Class B except as provided for below:

A. Lower Winooski River

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/acres</u>
Unnamed tributary to Alder Brook	A2	6/6/69 ¹	0.4 mile

Description

Former water supply for Winooski, Essex Center, Essex Jct., & Pinewood Manor (No longer used). Unnamed tributary and all waters within its watershed in Essex.

B. Middle Winooski River

Unnamed tributaries to Brook.

Formerly “Thatcher Brk & tribs”	A2	5/14/63	2.5 miles
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Village of Waterbury water supply. Unnamed tributaries to Thatcher Brook (Known locally as Tyler & Miriam Brooks).

Unnamed tributary to the West

Branch of the Little River	A2	7/1/71 ¹	1.3 miles
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Village of Stowe water supply. (Reserved for emergency use). An unnamed tributary to the West Branch of the Little River and all waters within its watershed in Stowe to the water intake.

C. Stevens Branch

Martin Brook, Reservoir &

Tributaries	A2	8/7/69	3.5 miles
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City of Barre water supply. (Reserved for emergency use). Martin Brook in Williamstown and all waters within its watershed, including unnamed tributaries, to the water intake.

Bolster Reservoir and tributaries	A2	8/7/62	2.0 acres (Res.) & 2.2 miles (tribs).
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Old City of Barre water supply. (It has been disconnected). Bolster Reservoir in South Barre and all waters within its watershed including Bolster Reservoir Brook, Pecks Pond and unnamed tributaries.

Thurman W. Dix Reservoir			119 acres &
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Lower Reservoir & tributaries	A2	8/7/62	9.9 miles
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City of Barre water supply. Thurman W. Dix Reservoir, Lower Reservoir and all waters within their watersheds in the Towns of Barre and Orange including Orange Brook, Nelson Brook, Nate Smith Brook and unnamed tributaries.

Section 4-09. Classification of the White River Basin (Basin 9)

All waters within this basin are Class B except as provided for below:

A. White River

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Acres</u>
Farnsworth Brook	A2	12/28/77	2.0 miles

Description

Village of East Braintree public water supply. Farnsworth Brook and all waters within its watershed in the Town of Braintree upstream of the water intake.

Lake Casper & Lake John	A2	12/28/77	No Record
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Village of South Royalton and F.D. #1 water supply. Lake Casper and Lake John and all waters within their watersheds in the Town of Royalton.

B. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified as A(2) above.	A1	5/17/86	No Record
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Section 4-10. Classification of the Ottauquechee-Black Basin (Basin 10)

All waters within this basin are Class B except as provided for below:

A. Ottauquechee River

<u>Water</u>	<u>Class</u>	<u>Date</u>	<u>Approx. miles/acres</u>
Spring and unnamed tributary to the Ottauquechee River	A2	11/16/67	0.3 miles

Description

Village of North Hartland water supply. (Reserved for emergency use). A spring and unnamed tributary to the Ottauquechee River and all waters within its watershed upstream of the water intake. The spring and brook are located approx. 1 mile north-northwest of North Hartland Village.

Cox, Vandell and Carlton Hill Reservoirs	A2	11/16/67	Approx. 2.5 miles (Stream only)
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Village of Woodstock water supply. (Private. Reserved for emergency use. Carlton Hill no longer in the system). Cox, Vandell and Carlton Hill Reservoirs in the Town of Woodstock and all waters within their watersheds.

Grant Brook (Off Jewell Brook)	A2	3/30/66	Approx. 3.2 miles
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Village of Ludlow water supply. (No longer in use). Grant Brook and all waters within its watershed upstream of the flood control dam.

B. Black River

Springfield Reservoir Brook	A2	3/30/66	1.8 miles
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Village of Springfield water supply. (Reserved for emergency use). Springfield Reservoir Brook and tributaries and all waters in its watershed upstream of Springfield Reservoir.

Springfield Reservoir and tributaries	A2	3/30/066	9.8 acres
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Village of Springfield water supply. (Reserved for emergency use). Springfield Reservoir all waters within its watershed.

C. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified as A(2) above

A1	5/17/86	No Record
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Section 4-11. *Classification of the West-Williams-Saxtons Basin (Basin 11)*

All waters within this basin are Class B except as provided for below:

A. West-Williams-Saxtons River

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Acres</u>
Sunset Lake & Stickney Brook	A2	7/26/78	3.0 sq. miles

Description

Town of Brattleboro water supply. Sunset Lake and Stickney Brook and all waters in their watersheds above the water intake in the Towns of Marlboro, Newfane, and Brattleboro. (Water intake is located at the so-called third dam, a distance of approx. 2.5 miles from Sunset Lake).

Styles Brooks	A2	7/26/78	1.0 sq. miles
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Stratton Corp. water supply. (Reserved for emergency use). Styles Brook and all waters in its watershed above the diversion to Styles Reservoir.

Chester Reservoir & the outlet stream above the water intake.

A2	7/26/78	1.0 sq. miles
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Village of Chester water supply. (Reserved for emergency use). Chester Reservoir, the outlet stream above the water intake and all waters within their watersheds in the Town of Chester. The water intake is approx. 0.3 mile below the reservoir.

Bolles Brook	A2	7/26/78	1.0 sq. miles
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Village of Saxtons River & Vermont Academy water supply. (Reserved for emergency use). Bolles Pond Brook and all waters in its watershed above the water intake in the Town of Rockingham.

Kidder Brook & tributaries	A1	10/11/89	Approx. 2.5 miles
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That portion of Kidder Brook and all its headwaters, including named and unnamed tributaries, beginning in the Town of Stratton at an elevation of 2,500 feet and continuing downstream to its confluence with the North Branch in the Town of Jamaica.

Cobb Brook	A1	10/09/91	Approx. 6.0 miles
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That portion of Cobb Brook and its tributaries beginning in the Town of Windham at an elevation of 2,500 feet and continuing downstream to its confluence with the West River in the Town of Jamaica.

Upper Reach of the Winhall River	A1	10/09/91	7.4 miles
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That portion of the upper reach of the Winhall River including the river's two principal headwaters, beginning at an elevation of 2,500' in the Town of Stratton, and continuing downstream a distance of approx. 7.4 miles to the point at which the river crosses the current boundary of the Green Mountain National Forest in the Town of Winhall.

B. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified as A(2) above.

A1	5/17/86	No record
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Section 4-12 Classification of the Deerfield Basin (Basin 12)

All waters within the basin are Class B except as provided for below:

A. Deerfield River

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Acres</u>
Haystack Pond	A2	1/27/61	36 acres

Description

Village of Wilmington water supply. Haystack Pond and all waters within its watershed in the Town of Wilmington.

Howe Pond and Howe Pond

Brook	A2	1/27/61	62 acres
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Village of Readsboro water supply. Howe Pond and all waters within its watershed. Howe Pond Brook and all waters within its watershed above the water intake, which is located approx. 1.1 miles downstream from Howe Pond. Both pond and brook are located in the Town of Readsboro.

Cold Brook	A1	10/7/96	1.5 miles
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That portion of **Cold Brook and its tributaries** between an elevation of 2,500 feet and continuing downstream to its confluence with Mountain Brook in the Town of Dover.

B. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified as A(2) above.

A1	5/17/86	No record
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Section 4-13. Classification of the Lower Connecticut Basin (Basin 13)

All waters within this basin are Class B except as provided for below:

A. Lower Connecticut River

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Acres</u>
Back Pond	A2	3/21/68	2.0 acres

Description

Village of Bellows Falls water supply. Back Pond and all water within its watershed, which is diverted to Minards Pond. Back Pond is located .1 mile north-west of Minards Pond in the Town of Rockingham.

Ellis Brook	A2	7/1/71 ¹	246 acres
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(watershed)

Village of Bellows Falls water supply. Ellis Brook and all waters in its watershed above the water intake, which is situated at elev. 715' MSL in the Town of Rockingham.

Farr Brook	A2	7/1/71 ¹	154 acres
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(watershed)

Village of Bellows Falls water supply. Farr Brook and all waters in its watershed above the water intake, which is located at elev. 710' MSL in the Town of Rockingham.

Unnamed tributary to Mill Brook	A2	7/1/71 ¹	1.7 miles
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Village of Ascutney water supply. (Reserved for emergency use). Unnamed tributary to Mill Brook and all waters in its watershed above the water intake. The unnamed tributary is the first tributary to Mill Brook in the Town of Weathersfield.

Pleasant Valley Reservoir	A2	3/21/68 ¹	25 acres
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Village of Brattleboro water supply. Pleasant Valley Reservoir and all waters in its watershed in the Town of Brattleboro. (Also refer to the classification of Sunset Lake & Stickney Brook - Basin #11)

Mill Brook	A2	3/21/68 ¹	Approx. 3.0 miles
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Kurn Hattin School water supply. (Reserved for emergency use). Mill Brook and all water within its watershed above the water intake in the Town of Westminster. The intake is located approx. 1.0 miles upstream of its confluence with the Connecticut River.

Wright, Upper Hurricane & Lower

Hurricane Reservoir	A2	7/1/71 ¹	10.4 acres
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Hartford Town water supply. Wright, Upper Hurricane and Lower Hurricane Reservoirs and all waters within their watersheds in the Town of Hartford.

B. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified

as A(2) above	A1	5/17/86	No record
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Section 4-14. Classification of the Stevens-Wells-Waits-Ompompanoosuc Basin (Basin 14)

All waters within this basin are Class B except as provided for below:

A. Waits River

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Acres</u>
Mill Pond Brook	A2	2/19/60	3.0 miles

Description

Village of Bradford water supply. (Reserved for emergency use). Mill Pond Brook and all waters within its watershed above the intake dam in the Towns of Fairlee, Bradford and West Fairlee.

Artificial impoundment on South

Peacham Hollow Brook	A2	4/28/76 ¹	No record
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Peacham Fire District #1 water supply. (The intake has been removed, and the town has gone to wells. No record of system anymore). An artificial impoundment on South Peacham Hollow Brook, and all waters within its watershed above the intake. The impoundment is located approx. 1/2 mile east of Fosters Road in the Town of Peacham.

B. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified as A(2) above.

	A1	5/17/86	No record
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Section 4-15. Classification of the Passumpsic Basin (Basin 15)

All waters within this basin are Class B except as provided for below:

A. Passumpsic River

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. miles/acres</u>
Unnamed tributary to Miller Run including Mathewson Reservoir	A2	4/28/76 ¹	Approx. 1.5 miles

Description

Village of Lyndonville water supply. (Reserved for emergency uses). Unnamed tributary to Miller Run including Mathewson Reservoir and all waters within their watersheds above the intake in the Towns of Lyndon and Sutton.

Unnamed tributary to Miller Run

including Copeland Reservoir	A2	4/28/76 ¹	Approx. 1.5 miles
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Village of Lyndonville water supply. (Reserved for emergency uses). Unnamed tributary to Miller Run including Copeland Reservoir and all waters within their watersheds above the intake in the Towns of Lyndon and Sutton.

Two unnamed tributaries to

Sutton River	A2	4/28/76 ¹	Approx. 0.8 mile
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Unknown water supply. Two unnamed tributaries to the Sutton River, near W. Burke, and all waters within their watersheds above the Murray water system intakes.

Chandler Pond	A2	4/28/76 ¹	59 acres
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Lyndonville Village water supply. (Reserved for emergency use) Chandler Pond and all waters within its watershed in the Town of Wheelock. Wheelock Pond drains to the South Wheelock Branch.

Woodworth Reservoir	A2	4/28/76 ¹	No Record
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Lyndonville water supply. (Reserved for emergency use) Woodworth Reservoir and all waters within its watershed in the Town of Lyndon. Woodworth Reservoir flows to the South Wheelock Branch.

Stiles Pond	A2	4/28/76 ¹	5.5 miles 146 acres (Stiles Pond)
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St. Johnsbury Village water supply. Stiles Pond and all waters within its watershed in the Town of Waterford. Stiles Pond is in the St. Johnsbury municipal forest and flows to the Moose River.

Danville Reservoir	A2	4/28/76 ¹	2.0 miles
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Danville Fire District No. 1 water supply. Danville Reservoir on tributary of Brown Brook and all waters within its watershed in Danville.

B. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified

as A(2) above.	A1	5/17/86	No record
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Section 4-16. Classification of the Northern Connecticut Basin (Basin 16)

All waters within this basin are Class B except as provided for below:

A. Upper Connecticut River

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. Miles/Acres</u>
Charles Brown Brook	A2	7/1/71 ¹	2.5 miles

Description

Village of Norwich water supply. (Reserved for emergency use). Charles Brown Brook and all waters within its watershed above the water intake in the Town of Norwich.

Unnamed tributary to Connecticut

River	A2	7/1/71 ¹	1.0 mile
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Village of Newbury water supply. An unnamed tributary to the Connecticut River and all waters within its watershed above the water intake in the Town of Newbury. The tributary is approx. one mile south of Pulaski Mt. The intake is located approx. 0.7 mile upstream of its confluence with the Connecticut River.

Unnamed tributary to Connecticut

River	A2	7/1/71 ¹	0.2 mile
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Village of Bloomfield water supply. An unnamed tributary to the Connecticut River and all waters within its watershed above the water intake in the Town of Bloomfield. The intake is approx. 0.5 mile above "Basin Hole."

Unnamed tributary to Lake Morey	A2	7/1/71 ¹	1.1 miles
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Village of Fairlee water supply. (Reserved for emergency use). An unnamed tributary to Lake Morey and all waters in its watershed in the Town of Fairlee to the water intake dam, including a man-made impoundment.

B. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified

as A(2) above.	A1	5/17/86	No record
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Section 4-17. Classification of the Memphremagog Basin (Basin 17)

All waters within this basin are Class B except as provided for below:

A. Lake Memphremagog and International Stream

<u>Waters</u>	<u>Class</u>	<u>Date</u>	<u>Approx. miles/acres</u>
Unnamed reservoir near Derby Line	A2	7/1/71 ¹	No record

Description

Derby Line water supply. An unnamed reservoir and all waters in its watershed in the Town of Derby.

May Pond Brook and May Pond	A2	10/30/87	13 acres
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Village of Barton water supply. May Pond Brook and all waters within its watershed in the Town of Barton above and including the water supply reservoir and May Pond. The reservoir is located approximately 3/4 mile upstream of the brook's confluence with Crystal Lake.

B. Black-Barton-Clyde Rivers

Unnamed tributary to the Black River	A2	2/20/75 ¹	1.0 mile
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Coventry Fire District #1 water supply. (Reserved for emergency use.) An unnamed tributary to the Black River and all waters within its watershed above the water intake in the Town of Coventry.

Unnamed tributary to Island Pond	A2	2/20/75	1.0 mile
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Town of Brighton water supply. An unnamed tributary to Island Pond and all waters within its watershed in the Town of Brighton above the water intake at approx. elev. of 1544.0' MSL. The tributary flows northerly to Island Pond.

Unnamed tributary to Lightning Brook	A2	2/20/75	2.0 miles
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Town of Brighton water supply. Two unnamed tributaries to an unnamed tributary to Lightning Brook and all waters in their watersheds in the Town of Brighton above the intakes. The main intake is at approx. elevation 1526.0' MSL, and the upper, more northerly intake is diverted to the main intake.

C. Entire Basin

All waters located above 2,500 feet altitude, National Geodetic Vertical Datum, unless specifically classified as A(2) above.

	A1	5/17/86	No record.
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APPENDIX A - Fish Habitat Designation

A. Warm Water Fish Habitat

All wetlands, except those designated as cold water fish habitat in paragraph B below, and the following waters are designated as warm water fish habitat for purposes of these rules:

1. Battenkill, Walloomsac, Hoosic Basin

- (a) Lake Hancock (Sucker Pond), Stamford
- (b) Thompsons Pond, Pownal

2. Poultney, Mettawee Basin

- (a) All waters west of Vermont Route 22A.
- (b) Austin Pond, Hubbardton
- (c) Beebe Pond, Hubbardton
- (d) Billings Marsh Pond, West Haven
- (e) Burr Pond, Sudbury
- (f) Coggman Pond, West Haven
- (g) Echo Lake (Keeler Pond) Hubbardton/Sudbury
- (h) Half Moon Pond, Hubbardton
- (i) Hinkum Pond, Sudbury
- (j) Lake Hortonia, Hubbardton/Sudbury
- (k) Inman Pond, Fair Haven
- (l) Lily Pond, Poultney
- (m) Little Pond, Wells
- (n) Love's Marsh, Castleton
- (o) Mill Pond (Parson's Mill Pond), Benson
- (p) Northeast Developer's Pond, Wells
- (q) Old Marsh Pond, Fair Haven
- (r) Pine Pond, Castleton
- (s) Poultney River from Carvers Falls in West Haven to its confluence with Lake Champlain

- (t) Sunrise Lake, Benson/Orwell

3. Otter Creek, Little Otter Creek and Lewis Creek Basin

- (a) All waters lying west of Vermont Route 22A and south of the City of Vergennes.
- (b) Brilyea East Pond, Addison
- (c) Brilyea West Pond, Addison
- (d) Chipman Lake (Tinmouth Pond), Tinmouth
- (e) Danby Pond, Danby
- (f) East Creek Site I, Orwell
- (g) Fern Lake, Leicester
- (h) Lemon Fair River
- (i) Mud Pond, Leicester
- (j) Otter Creek from the outfall of the Proctor wastewater treatment facility in Proctor, to its confluence with Lake Champlain, except that portion between the Beldens Dam and the Huntington Falls Dam in New Haven/Weybridge.
- (k) Richville Pond, Shoreham
- (l) Stone Bridge Pond, Panton/Addison
- (m) Wallingford Pond, Wallingford

4. Lower Lake Champlain Basin

- (a) Lake Champlain south of the Crown Point Bridge.
- (b) Lake Champlain, between the Crown Point Bridge and the Ferrisburg-Charlotte town boundary, where depths are less than 25 feet at Low Lake Level (93 feet NGVD) - June 1, through September 30, only.
- (c) Perch Pond, Benson

5. Upper Lake Champlain Basin

- (a) All streams, creeks and brooks lying with Grand Isle County.
- (b) Lake Carmi, Franklin(c)

- (c) Lake Champlain, between the Ferrisberg-Charlotte town boundary and the Canadian boundary, where depths are less than 25 feet at Low Lake Level (93 feet NGVD) - June 1, through September 30, only.
- (d) Cutler Pond, Highgate
- (e) Holmes Creek, Charlotte,
- (f) Indian Brook, Colchester from Vermont Routes 2 & 7 to its confluence with Lake Champlain
- (g) Lake Iroquois, Hinesburg/Williston
- (h) LaPlatte River from its confluence with Patrick Brook in Hinesburg extending downstream to the Spear Street extension bridge in Charlotte annually from the period June 1 through September 30, only.
- (i) Long Pond, Milton
- (j) Lower Lake, (Lake Sunset), Hinesburg
- (k) Malletts Creek, Colchester, from Vermont Routes 2 & 7 to its confluence with Lake Champlain
- (l) Milton Pond, Milton
- (m) Mud Creek Pond, Alburg
- (n) Murr (Monroe) Brook, Shelburne
- (o) Rock River from the Canadian boundary to its confluence with Lake Champlain
- (p) Round Pond, Milton
- (q) St. Albans Reservoir (N), Fairfax
- (r) Stevens Brook, St. Albans

6. Missisquoi Basin

- (a) Metcalf Pond, Fletcher
- (b) Fairfield Pond, Fairfield
- (c) Fairfield Swamp Pond, Fairfield
- (d) Missisquoi River from the outfall of the Enosburg Falls wastewater treatment facility to the Swanton Dam Swanton

7. Lamoille Basin

- (a) Arrowhead Mountain Lake, Milton/Georgia
- (b) Flagg Pond, Wheelock
- (c) Halfman Pond, Fletcher
- (d) Hardwick Lake, Hardwick
- (e) Horse Pond, Greensboro
- (f) Lake Elmore, Elmore
- (g) Lamoille River from the Peterson Dam in Milton to its confluence with Lake Champlain - June 1, through September 30, only.
- (h) Long Pond (Belvidere Pond), Eden
- (i) Long Pond, Greensboro
- (j) Tuttle Pond, Hardwick
- (k) Wapanaki Lake, Wolcott

8. Winooski Basin

- (a) Berlin Pond, Berlin
- (b) Bliss Pond, Calais
- (c) Coits Pond, Cabot
- (d) Cranberry Meadow Pond, Woodbury
- (e) Curtis Pond, Calais
- (f) Gillett Pond, Richmond
- (g) Harwood Pond, Elmore
- (h) Molly's Pond, Cabot
- (i) North Montpelier Pond, East Montpelier/Calais

- (j) Richmond Pond, Richmond
- (k) Shelburne Pond, Shelburne
- (l) Sodom Pond, East Montpelier/Calais
- (m) Valley Lake (Dog Pond), Woodbury
- (n) Winooski River from Green Mountain Power Corporation #19, in Essex/Williston to its confluence with Lake Champlain - June 1, through September 30, only.

9. White River Basin

- (a) Lamson Pond, Brookfield
- (b) Silver Lake, Barnard

10. Ottauquechee, Black Basin

- (a) Black River from the Lovejoy Dam in Springfield to its confluence with the Connecticut River - June 1, through September 30, only.
- (b) Deweys Mill Pond, Hartford
- (c) Lake Ninevah, Mount Holly
- (d) Lake Pinneo, Hartford
- (e) North Hartland Reservoir, Hartland/Hartford
- (f) North Springfield Reservoir, Springfield/Weathersfield
- (g) Ottauquechee River from the North Hartland Dam in Hartland to its confluence with the Connecticut River.

11. West, Williams, and Saxtons Basin

- (a) Burbee Pond, Windham
- (b) Cole Pond, Jamaica
- (c) Lily Pond, Londonderry
- (d) Lowell Lake, Londonderry

12. Deerfield Basin

- (a) Gates Pond, Whitingham
- (b) Grout Pond, Stratton

- (c) Howe Pond, Readsboro
- (d) Jacksonville Pond, Whitingham
- (e) North Pond, Whitingham
- (f) Sadawaga Pond, Whitingham
- (g) Shippee Pond, Whitingham

13. Lower Connecticut, Mill Brook Basin

- (a) Lake Runnemed (Evert's Pond), Windsor
- (b) Lily Pond, Vernon
- (c) Mindards Pond, Rockingham

14. Stevens, Wells, Waits, Ompompanoosuc Basin

- (a) Lake Abenaki, Thetford
- (b) Ticklenaked Pond, Ryegate
- (c) Waits River from the CVPS Dam in Bradford to its confluence with the Connecticut River - June 1, to September 30.

15. Passumpsic Basin

- (a) Bruce Pond, Sheffield
- (b) Chandler, Wheelock
- (c) Keiser Pond, Peacham/Danville

16. Upper Connecticut, Nulhegan, Willard Stream, Paul Stream Basin

- (a) Dennis Pond, Brunswick
- (b) Halls Lake, Newbury
- (c) Harriman Pond, Newbury
- (d) Lake Morey, Fairlee
- (e) Lower Symes Pond, Ryegate
- (f) Stevens Pond, Maidstone

17. Lake Memphremagog, Black, Barton, Clyde, Coaticock, Basin

- (a) Daniels Pond, Glover
- (b) Lake Derby, Derby

- (c) Long Pond, Sheffield
- (d) Little Hosmer Pond, Craftsbury
- (e) Mud Pond, Craftsbury
- (f) Mud Pond, (North) Morgan
- (g) Tildy's Pond (Clark Pond), Glover
- (h) Toad Pond, Charleston
- (i) Turtle Pond, Holland

B. Cold Water Fish Habitat

1. All waters not designated as warm water fish habitat by subsection A are hereby designated as cold water fish habitat for purposes of these rules.
2. The following wetlands are designated as cold water fish habitat:
 - (a) Those wetlands adjacent to the Dog River and its tributaries from the headwaters of the Dog River to the point where it first crosses State Aid highway #62 in Roxbury, a distance of approximately 1.5 miles.
 - (b) Those wetlands adjacent to the headwaters of the Winhall River and its tributaries on the east and west side from the outlet of Stratton Pond to the Stratton-Winhall boundary, a distance of approximately 2.0 miles.
 - (c) Those wetlands adjacent to the Batten Kill River from a point .75 miles north of East Dorset and extending to its confluence with Dufresne Pond in Manchester, a distance of approximately 5.5 miles.
 - (d) Those wetlands adjacent to the New Haven River and its tributaries from its confluence with Blue Bank Brook in Lincoln upstream to the headwaters of the respective tributaries, a distance of approximately 1.75 miles.

Appendix B - Phosphorus Criteria §3-01(A)(2)(c), Description of Lake Champlain and Lake Memphremagog segments.

<u>Segment</u>	<u>Description</u>
Lake Champlain	
Missisquoi Bay	Area north of East Alburg (Route 78) bridge and south of the international border.
Isle La Motte	Area within Vermont waters

	west of Grand Isle and North Hero Islands, and north of a line from Cumberland Head, NY to Wilcox Point on Grand Isle.
St. Albans Bay	Area northeast of a line from Hathaway Point to Lime Rock Point.
Northeast Arm	Area within Vermont Waters east of Grand Isle and North Hero Islands, and north of the Sandbar Bridge, excluding St. Albans Bay, and including the large bays on Grand Isle and North Hero.
Malletts Bay	Area south of Sandbar Bridge and east of the causeway from Colchester Point to Grand Isle.
Main Lake	Area within Vermont waters south of a line from Cumberland Head, NY to Wilcox Point on Grand Isle, and north of a line from Split Rock Point, NY to Thompsons Point, VT, excluding Malletts Bay, Burlington Bay and Shelburne Bay.
Burlington Bay	Area east of a line from Lone Rock Point to Oakledge.
Shelburne Bay	Area south of a line from Shelburne Point to Red Rock Point.
Otter Creek	Area within Vermont waters south of a line from Split

Rock Point, NY to Thompsons Point, VT, and north of a line from Rock Harbor, NY to Basin Harbor, VT.

Port Henry

Area within Vermont waters south of a line from Rock Harbor, NY to Basin Harbor, VT, and north of Crown Point Bridge.

South Lake A

Area within Vermont waters south of Crown Point Bridge and north Benson Landing.

South Lake B

Area within Vermont waters south of Benson Landing.

Lake Memphremagog

Main Lake

Area within Vermont waters north of the Route 5 Bridge.

South Bay

Area south of the Route 5 bridge and north of the mouth of the Barton River.

Appendix C: Water Quality Criteria for the Protection of Human Health and the Aquatic Biota

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria ^a .	Average Allowable Concentration - Chronic Criteria ^a .
<i>Toxic Metals</i>							
Antimony	65FR66443	7440360	TT	5.6	640	---	---
Arsenic	65FR31682	7440382	A	0.02 ^g	1.5 ^g	340	150
Cadmium ^{d. e.}	65FR31682	7440439	TT	---	---	1.03	0.15
Chromium (VI) ^{d.}	65FR31682	18540299	TT	---	---	16	11
Chromium (III) ^{d. e.}	EPA820/B-96-001	16065831	TT	---	---	322	42
Copper ^{d. e.}	65FR31682	7440508	TT	---	---	7.0	4.95
Cyanide	EPA820/B-96-001 68FR75510	57125	TT	140	140	22 ⁿ	5.2 ⁿ
Iron ^{c.}	EPA 440/5-86-001	7439896	TT	300	---	---	1,000
Lead ^{d. e.}	65FR31682	7439921	TT	---	---	30.1	1.17

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Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria ^a .	Average Allowable Concentration - Chronic Criteria ^a .
Mercury	62FR42160 EPA 440/5-86-001	7439976	TT/BC	---	---	1.4 ^{d.f.}	0.012 (1986)
Methylmercury	EPA823-R-01-001	22967926	---	---	0.3 mg/kg ^l	---	---
Nickel ^{d.e.}	65FR31682	7440020	TT	610	4,600	260	29
Selenium	62FR42160 65FR31682 65FR66443	7782492	TT	170	4200	i.	5
Silver ^{d.e.}	65FR31682	7440224	TT	---	---	1.02	---
Thallium	68FR75510	7440280	TT	0.24	0.47	---	---
Zinc ^{d.e.}	65FR31682	7440666	TT	---	---	65	65
<i>Volatile Organic Compounds</i>							
Acrolein	74FR27535 74FR46587	107028	TT	6	9	3	3

Appendix C: Water Quality Criteria for the Protection of Human Health and the Aquatic Biota

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria ^a .	Average Allowable Concentration - Chronic Criteria ^a .
Acrylonitrile	65FR66443	107131	C	0.051 ^h	0.25 ^h	---	---
Benzene	IRIS 01/19/00 65FR66443	71432	A	2.2 ^h	51 ^h	---	---
Bromoform	65FR66443	75252	C	4.3 ^h	140 ^h	---	---
Carbon Tetrachloride	65FR66443	56235	C	0.23 ^h	1.6 ^h	---	---
Chlorodibromomethane	65FR66443	124481	C	0.40 ^h	13 ^h	---	---
Chloroform	62FR42160	67663	C	5.7	470	---	---
Dichlorobromomethane	65FR66443	75274	C	0.55 ^h	17 ^h	---	---
1,2-Dichloroethane	65FR66443	107062	C	0.38 ^h	37 ^h	---	---
1,1-Dichloroethylene	68FR75510	75354	C	330	7,100	---	---
1,2-Dichloropropane	65FR66443	78875	---	0.50 ^h	15 ^h	---	---
1,3-Dichloropropylene	68FR75510	542756	TT	0.34	21	---	---
Ethylbenzene	68FR75510	100414	TT	530	2,100	---	---
Methyl Bromide	65FR66443	74839	TT	47 ^h	1,500 ^h	---	---

Appendix C: Water Quality Criteria for the Protection of Human Health and the Aquatic Biota

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria ^a	Average Allowable Concentration - Chronic Criteria ^a
Methylene Chloride	65FR66443	75092	C	4.6 ^h	590 ^h - 1,600	---	---
Monochlorobenzene	68FR75510	108907	TT	130	1,600 - 21,000	---	---
1,1,2,2-Tetrachloroethane	65FR66443	79345	C/BC	0.17 ^h	4.0 ^h - 11	---	---
Tetrachloroethylene	65FR66443	127184	C	0.69	3.3 - 8.85	---	---
Toluene	68FR75510	108883	TT	1,300	15,000 - 200,000	---	---
1,2-Trans-Dichloroethylene	68FR75510	156605	---	140	10,000	---	---
1,1,2-Trichloroethane	65FR66443	79005	C	0.59 ^h	16 ^h - 42	---	---
Trichloroethylene	65FR66443	79016	C	2.5	30 - 84	---	---
<i>Acid Organic Compounds</i>							
Vinyl Chloride	68FR75510	75014	C	0.025	2.4	---	---
2-Chlorophenol	65FR66443	95578	---	81 ^h	150 ^h	---	---
2,4-Dichlorophenol	65FR66443	120832	TT	77 ^h	290 ^h	---	---
2,4-Dimethylphenol	65FR66443	105679	---	380 ^h	850 ^h	---	---
2,4 Dinitrophenol	65FR66443	51285	TT	69 ^h	5,300 ^h	---	---

Appendix C: Water Quality Criteria for the Protection of Human Health and the Aquatic Biota

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria ^a	Average Allowable Concentration - Chronic Criteria ^a
2-Methyl-4,6-Dinitrophenol	65FR66443	534521	TT	13	280	---	---
Pentachlorophenol	65FR31682	87865	C/BC	0.27 ^h	3.0 ^h	19 ^k	15 ^k
	65FR66443					---	---
Phenol	74FR27535	108952	TT	10,000	860,000	---	---
Nonylphenol	EPA-822-F05-003	84852153	C/BC	---	---	28	6.6
2,4,6-Trichlorophenol	65FR66443	88062	C/BC	1.4 ^h	2.4 ^h	---	---
<i>Base Neutral Compounds</i>							
Acenaphthene	65FR66443	83329	---	670 ^h	990 ^h	---	---
Anthracene	65FR66443	120127	TT/BC	8,300 ^h	40,000 ^h	---	---
Benzidine	65FR66443	92875	A	0.000086 ^h	0.00020 ^h	---	---
Benzo(a)Anthracene	65FR66443	56553	C/BC	0.0038 ^h	0.018 ^h	---	---
Benzo(a)Pyrene	65FR66443	50328	C/BC	0.0038 ^h	0.018 ^h	---	---
Benzo(b)Fluoranthene	65FR66443	205992	C/BC	0.0038 ^h	0.018 ^h	---	---
Benzo(k)Fluoranthene	65FR66443	207089	C/CB	0.0038 ^h	0.018 ^h	---	---
Bis(2-Ethylhexyl)Phthalate	65FR66443	117817	C/BC	1.2 ^h	2.2 ^h	---	---

Appendix C: Water Quality Criteria for the Protection of Human Health and the Aquatic Biota

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria ^a .	Average Allowable Concentration - Chronic Criteria ^a .
Butylbenzyl Phthalate ^w	IRIS 02/01/93	85687	C/BC	1,500 ^h	1,900 ^h	---	---
Chloroethyl ether (Bis-2)	65FR66443	111444	C	0.031 ^h	0.53 ^h	---	---
Chloroisopropyl ether(Bis-2)	65FR66443	108601	TT	1,400 ^h	65,000 ^h	---	---
Chrysene	65FR66443	218019	C/BC	0.0038 ^h	0.018 ^h	---	---
Dibenzo(a,h)Anthracene	65FR66443	53703	C/BC	0.0038 ^h	0.018 ^h	---	---
1,2-Dichlorobenzene	68FR75510	95501	TT/BC	420	1,300	---	---
1,3-Dichlorobenzene	65FR66443	541731	TT/BC	320	960	---	---
1,4-Dichlorobenzene	68FR75510	106467	TT/BC	63	190	---	---
3,3'-Dichlorobenzidine	65FR66443	91941	C/BC	0.021 ^h	0.028 ^h	---	---
Diethyl Phthalate	65FR66443	84662	TT	17,000 ^h	44,000 ^h	---	---
Dimethyl Phthalate	65FR66443	131113	TT	270,000	1,100,000	---	---
Di-n-butyl Phthalate	65FR66443	84742	TT/BC	2,000	4,500	---	---
2,4-Dinitrotoluene	65FR66443	121142	C	0.11	3.4	---	---
1,2-Diphenylhydrazine	65FR66443	122667	C	0.036 ^h	0.2 ^h	---	---

Appendix C: Water Quality Criteria for the Protection of Human Health and the Aquatic Biota

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria ^a .	Average Allowable Concentration - Chronic Criteria ^a .
Fluoranthene	65FR66443	206440	TT/BC	130 ^h	140 ^h	---	---
Fluorene	65FR66443	86737	TT/BC	1,100 ^h	5,300 ^h	---	---
Hexachlorobenzene	65FR66443	118741	C/BC	0.00028	0.00029	---	---
Hexachlorobutadiene	65FR66443	87683	C/BC	0.44 ^h	18 ^h 50	---	---
Hexachlorocyclopentadiene	68FR75510	77474	TT/BC	40	1,100	---	---
Hexachloroethane	65FR66443	67721	C/BC	1.4 ^h	3.3 ^h	---	---
Indeno(1,2,3-cd)Pyrene	65FR66443	193395	C/BC	0.0038 ^h	0.018 ^h	---	---
Isophorone	65FR66443	78591	TT	35 ^h	960 ^h	---	---
Nitrobenzene	65FR66443	98953	TT	17 ^h	690 ^h	---	---
N-Nitrosodimethylamine	65FR66443	62759	C	0.00069 ^h	3.0 ^h	---	---
N-Nitrosodi-n-Propylamine	65FR66443	621647	---	0.0050 ^h	0.51 ^h	---	---
N-Nitrosodiphenylamine	65FR66443	86306	C	3.3 ^h	6.0 ^h	---	---
Pyrene	68FR75510	129000	TT/BC	830 ^h	4,000 ^h	---	---
1,2,4-Trichlorobenzene	68FR75510	120821	---	35	70	---	---

Appendix C: Water Quality Criteria for the Protection of Human Health and the Aquatic Biota

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria ^a .	Average Allowable Concentration - Chronic Criteria ^a .
<i>Pesticides/PCBs</i>							
Aldrin	65FR31682	309002	C/BC	0.000049 ^h	0.000050 ^h	3.0 ^b	---
	65FR66443					---	---
Carbaryl	EPA-820-R-12-007	63252	TT	---	---	2.1	2.1
Chlordane	65FR31682	57749	C/BC	0.00080 ^h	0.00081 ^h	2.4 ^b	.004 ^b
	65FR66443					---	---
Chlorpyrifos ^c	EPA 440/5-86-001	2921882	---	---	---	0.083	0.041
4,4'-DDT	65FR31682	50293	C/BC	0.00022 ^h	0.00022 ^h	1.1 ^b	0.001 ^b
	65FR66443					---	---
4,4'-DDE	65FR66443	72559	C/BC	0.00022 ^h	0.00022 ^h	---	---
4,4'-DDD	65FR66443	72548	C/BC	0.00031 ^h	0.00031 ^h	---	---
Demeton ^c	EPA 440/5-86-001	8065483	---	---	---	---	0.1

Appendix C: Water Quality Criteria for the Protection of Human Health and the Aquatic Biota

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria ^a .	Average Allowable Concentration - Chronic Criteria ^a .
Diazinon	EPA-822-R-05-006	333415	TT	---	---	0.17	0.17
Dieldrin	65FR31682	60571	C	0.000052 ^h	0.000054 ^h	0.24	0.056
	65FR66443						
alpha-Endosulfan	65FR31682	959988	TT	62 ^h	89 ^h	0.22 ^b	0.056 ^b
	65FR66443						
beta-Endosulfan	65FR31682	33213659	TT	62 ^h	89 ^h	0.22 ^b	0.056 ^b
	65FR66443						
Endosulfan Sulfate	65FR66443	1031078	TT	62 ^h	89 ^h	---	---
Endrin	65FR31682	72208	TT	0.059	0.060	0.086	0.036
	68FR75510						
Endrin Aldehyde	65FR66443	7421934	TT	0.29 ^h	0.30 ^h	---	---
Heptachlor	65FR31682	76448	C	0.000079 ^h	0.000079 ^h	0.52 ^b	0.0038 ^b
	65FR66443						

Appendix C: Water Quality Criteria for the Protection of Human Health and the Aquatic Biota

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria ^a	Average Allowable Concentration - Chronic Criteria ^a
Heptachlor Epoxide	65FR31682 65FR66443	1024573	C	0.000039 ^h	0.000039 ^h	0.52 ^b	0.0038 ^b
Benzene hexachloride-alpha	65FR66443	319846	C/BC	0.0026 ^h	0.0049 ^h	---	---
Benzene hexachloride-beta	65FR66443	319857	C/BC	0.0091 ^h	0.017 ^h	---	---
Benzene hexachloride-gamma (Lindane)	65FR31682 68FR75510	58899	TT/BC	0.98	1.8	0.95	---
Malathion ^c	EPA 440/5-86-001	121755	---	---	---	---	0.1
Parathion ^c	EPA 440/5-86-001	56382	---	---	---	0.065	0.013
Total PCB's ^m	65FR31682 65FR66443	53469219	C/BC	0.000064 ^h	0.000064 ^h	---	0.014 ^b
Dioxin (2,3,7,8-TCDD)	65FR66443	1746016	C/BC	5.0x10 ⁻⁹	5.1x10 ⁻⁹	---	---
Toxaphene	65FR31682	8001352	C/BC	0.00028 ^h	0.00028 ^h	0.73	0.0002

Appendix C: Water Quality Criteria for the Protection of Human Health and the Aquatic Biota

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria ^a .	Average Allowable Concentration - Chronic Criteria ^a .
	65FR66443						
<i>Other Substances</i>							
Ammonia ^c	EPA 822-R-13-001	7664417	---	---	---	see EPA April 2013 water quality criteria document for Ammonia. Tables 5a and 5b provide the acute criteria values and Table 6 provides the chronic criteria.	
Asbestos	57FR60848	1332214	A	7 million fibers/L	---	---	---
Barium ^c	EPA 440/5-86-001	7440393	---	1,000	---	---	---
Chlorine ^c	EPA 440/5-86-001	7782505	---	---	---	19	11
Chloride ^c	53FR19028	16887006	---	---	---	860,000	230,000

GENERAL NOTES:

This Appendix has been updated to reflect USEPA recommendations as of October 2012. These recommendations were published in “National Recommended Water Quality Criteria,” and can be found at <http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

The most significant changes from previous versions of Appendix C are to Human Health criteria and reflect EPA’s new methodology for deriving human health criteria (Methodology for Deriving Ambient Water Quality for the Protection of Human Health” (2000), EPA-822-B-00-004, October, 2000) as published in 65 FR 66443. Additional notes and information concerning these criteria can be found in the documents referenced here. Equations used to calculate hardness-dependent metal criteria have been updated (Appendix E) and factors for converting total recoverable-based to dissolved-based criteria for metals (Appendix D) have been added to reflect current recommendations of USEPA.

“FR Cite/Source” citations have been added to all criteria. This citation refers to the EPA publication from which the criteria are derived. The “Gold Book” is Quality Criteria for Water: 1986. EPA 440/5-86-001.

Chemical Abstracts Service (CAS) registry numbers have been added to Appendix C. CAS numbers provide a unique identification for each chemical.

Tox Class - designated toxicity class for substance: A=Class A carcinogen (known human carcinogen); C=Carcinogenic (probable or possible human carcinogen); TT=Threshold Toxicant (not a known or probable carcinogen); BC=High potential to bioconcentrate or bioaccumulate;

Carcinogenic - for those toxic substances which are identified as carcinogens (A or C) the criteria have been established at a risk level of 10^{-6} assuming a lifetime exposure to a 70 Kg male consuming 17.5 grams per day of fish and shell-fish products and ingesting 2.0 liters of water per day.

Threshold Toxicants - for those toxic substances which are identified as non-carcinogens (TT) the criteria are best estimates of concentrations which are not expected to produce adverse effects in human health assuming a lifetime exposure to a 70 Kg male consuming 17.5 grams per day of fish and shell-fish products and ingesting 2.0 liters of water per day.

Footnotes:

- a. Maximum Allowable Concentration (MAC) = the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) once every three years without deleterious effects. Average Allowable Concentration (AAC) - the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) once every three years without deleterious effects. $\mu\text{g}/\text{l}$ = micrograms per liter. The MAC is the equivalent to the Federal Criteria Maximum Concentration (CMC) and the AAC is equivalent to the Federal Criteria Continuous Concentration (CCC).

- b. The aquatic life criteria for this compound were developed in 1980 using 1980 EPA guidelines for criteria development. The MAC (CMC) or acute value shown is a final acute value (FAV) which by the 1980 guidelines is an instantaneous value.
- c. Compound is not listed in EPA's Section 304(a) Criteria for Priority Toxic Pollutants as published in the December 22, 1992, pages 60911-60917, of the Federal Register but is included in Appendix C of the Vermont Water Quality Standards because the pollutant can be deleterious to aquatic life and criteria have been developed for the protection of aquatic organisms.
- d. Criteria for this metal are expressed in terms of dissolved metal in the water column. Dissolved metal concentrations in the water column can be determined analytically or can be estimated from total metal concentrations using the conversion factors in Appendix D.
- e. Aquatic life criteria for this metal is expressed as a function of total hardness (mg/l as CaCO₃) in the water column and as a function of the pollutant's water effect ratio, WER, as defined in §131.36(c). Unless otherwise determined by the Secretary, in a manner consistent with the most current USEPA guidance, the WER shall be 1.0. The specific value given here corresponds to a hardness of 50 mg/l. Criteria values for other hardness may be calculated from the equations shown in Appendix E.
- f. This criterion was derived from data for inorganic mercury (II) but is applied here to total mercury.
- g. Vermont promulgated numerical criteria for arsenic based on freshwater fish species bioconcentration factors (BCF). A BCF of 4 was used to calculate human health protection criteria.
- h. This criterion has been revised to reflect The Environmental Protection Agency's q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of May 17, 2002. The fish tissue bioconcentration factor (BCF) from the 1980 Ambient Water Quality Criteria document was retained in each case.
- i. The $MAC = 1 / [(f1/MAC1) + (f2/MAC2)]$ where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and MAC1 and MAC2 are 185.9 g/l and 12.82 g/l, respectively. This value for selenium is expressed in terms of total recoverable metal in the water column. It can be expressed in terms of dissolved metal by using the conversion factor (0.996- MAC or 0.922- AAC).
- j. This human health criterion is the same as originally published in the Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value is now published in the Gold Book.
- k. Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: $MAC = \exp(1.005(\text{pH}) - 4.869)$; $AAC = \exp(1.005(\text{pH}) - 5.134)$. Values displayed in table correspond to a pH of 7.8.

- l. This fish tissue residue criterion for methylmercury is used for the purpose of determination of attainment pursuant to these Standards. Fish consumption advisory guidance for mercury in fish taken from the waters of Vermont is developed by the Vermont Department of Health and is available on their website.
- m. These criteria apply to total PCB's (e.g. the sum of all congener or all isomer or homolog or Arochlor analyses).
- n. These criteria expressed as ug free cyanide (as CN)/l.

Appendix D: Conversion factors for estimating dissolved metals from total values.

To convert total metal values to dissolved metal, multiply total metal values/concentrations by the conversion factor listed (or calculated) in the table below. Alternative methods for translating total to dissolved values following USEPA guidance (“The Metals Translator: Guidance for Calculating a Total Recoverable Metals Permit Limit from a Dissolved Criterion”; EPA 823-B-96-007) may be considered on a case-by-case basis.

Metal	Conversion Factor for MAC	Conversion Factor for AAC
Arsenic	1.0	1.0
Cadmium	$1.136672 - [(\ln \text{ hardness})(0.041838)]$	$1.101672 [(\ln \text{ hardness})(0.041838)]$
Chromium III	0.316	0.860
Chromium VI	0.982	0.962
Copper	0.96	0.96
Lead	$1.46204 - [(\ln \text{ hardness})(0.145712)]$	$1.46203 - [(\ln \text{ hardness})(0.145712)]$
Mercury	0.85	0.85
Nickel	0.998	0.997
Selenium	---	---
Silver	0.85	---
Zinc	0.978	0.986

Appendix E: Parameters for Calculating Freshwater Total Metals Criteria that are Hardness-Dependent.

MAC and AAC values are calculated using the equations below the table and inserting the metal-specific values shown in the table.

Metal	m_A	b_A	m_C	b_C
Cadmium	1.0166	-3.924	0.7409	-4.719
Chromium III	0.8190	3.7256	0.8190	0.6848
Copper	0.9422	-1.700	0.8545	-1.702
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	-6.59	---	---
Zinc	0.8473	0.884	0.8473	0.884

Hardness-dependent metals criteria can be calculated from the following equations:

$$\text{MAC (dissolved)} = \exp\{m_A [\ln (\text{hardness})] + b_A\} \text{ (Conversion Factor from Appendix D)}$$

$$\text{AAC (dissolved)} = \exp\{m_C [\ln (\text{hardness})] + b_C\} \text{ (Conversion Factor from Appendix D)}$$