# DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

## DIVISION OF WATERSHED STEWARDSHIP

Statutory Authority: 7 Delaware Code, Section 6010 (7 **Del.C.** §6010)
7 **DE Admin. Code** 7401

## FINAL

**Secretary's Order No. 2014-WS-0019**

**7401 Surface Water Quality Standards**

**Date of Issuance: August 21, 2014**
**Effective Date: October 11, 2014**

Under the authority vested in the Secretary of the Department of Natural Resources and Environmental Control ("Department" or "DNREC") under 29 **Del.C.** §8001 et seq., 29 **Del.C.** §10111 et seq. and 7 **Del.C.** §6010(a), the following findings, reasons and conclusions are entered as an Order of the Secretary to amend the regulation, 7 **DE Admin. Code** 7401, Surface Water Quality Standards. (Regulation 7401). The attached Hearing Officer's Report (Report) reviews the record and recommends approval of the proposed amendment. The Report is adopted to the extent it is consistent with this Order.

The Department's Division of Watershed Stewardship, Watershed Assessment and Management Section (WAMS), prepared the proposed amendment. The proposed amendment reflects a small change to be consistent with the proposed change to the Murderkill River Total Maximum Daily Loads (TMDLs) and other changes warranted by changes to federal regulations. The change to the Murderkill River TMDL will establish seasonal limits based upon considerable research on the Murderkill River's water quality. This research was undertaken as a result of a court approved settlement of an appeal of the Department's Regulation that established Total Maximum Daily Loads (TMDLs) for the Murderkill River. The Department and Kent County funded addition water quality studies that determined that the tidal area of the Murderkill River from the Route 1 bridge near Frederica to the Murderkill River's mouth in the Delaware Bay should have site specific water quality standards. The tidal area is dominated by tidal marshlands that cause a significant impact of oxygen levels in the water, particularly during the warm weather months. WAMS determined that the presence of the tidal marshes supported changes to Regulation 7401 to reflect better information than was available when the Department last established the surface water standards in 2011.

The amendment to the Surface Water Quality Standards adds a provision to reflect the natural impact on water quality from the tidal marshlands, particularly during warmer weather, and reflects changes to federal regulations. WAMS determined that a seasonal variation in the surface water quality standards was supported by the studies, which WAMS applied as a lower dissolved oxygen limits for the warmer time period from May 16 through September 30 for the area impacted by the tidal marshlands, namely, the Murderkill River from the Route 1 bridge near Frederica to the Delaware Bay in Bowers Beach.

The Surface Water Quality Standards adopted by this Order are based upon sound scientific evidence, are consistent with state and federal law, and are a reasoned exercise of the Department's authority to issue regulations to improve water quality. The Surface Water Quality Standards will allow the Murderkill River's water quality to improve to reach the federal and state water quality standards, and reflect the natural impact of tidal marshlands in calculating the appropriate water quality standards to apply to the tidal portion of the Murderkill River.

In conclusion, the following findings and conclusions are entered:

1. The Department, acting through this Order of the Secretary, adopts the proposed regulation as a final regulation, as set forth in the Appendix A to the Report,

2. The approval of the proposed amendment to the regulation as the final regulation will protect and improve the water quality within the watershed by allowing the Department to regulate uses within the watershed to control the release of pollutants that have impaired the water quality from meeting the water quality standards;

3. The Regulation amendment approved by this Order was developed consistent with the applicable law and regulatory standards, and is supported by expert technical analysis;

4. The Department provided public notice of the proposed regulation and the public hearing in a manner required by the law and regulations,

5. The Department held a public hearing in a manner required by the law and regulations, and considered all timely and relevant public comments in making its determination;

6. The Department's proposed amendment to Regulation 7401, as published in the April 1, 2014, Delaware *Register of Regulations*, and as set forth in Appendix A to the Report, is well supported by the record, and is reasonable to regulate water quality consistent with the applicable laws and regulations.

7. The Department shall have published this Order in the Delaware *Register of Regulations*; and the notice in

newspapers, and the Regulation amendment will go into effect ten days after its publication in the Delaware *Register of Regulations*.

David S. Small, Secretary

## 7401 Surface Water Quality Standards

### 1.0 Intent

1.1 It is the policy of the Department to maintain within its jurisdiction surface waters of the State of satisfactory quality consistent with public health and public recreation purposes, the propagation and protection of fish and aquatic life, and other beneficial uses of the water.

1.2 Where conflicts develop between stated surface water uses, stream criteria, or discharge criteria, designated uses for each segment shall be paramount in determining the required stream criteria, which, in turn, shall be the basis of specific discharge limits or other necessary controls.

1.3 Where existing facilities operating under a permit from this Department are required to reduce pollution concentrations or loadings due to the implementation of these surface water quality standards, a reasonable schedule for compliance may be granted in accordance with standards or requirements established in applicable statutes and regulations.

1.4 The Department intends to develop an agency-wide program to assess, manage, and communicate human health cancer risks from the major categories of environmental pollution under its jurisdiction. As a result of this activity, it may be necessary to adjust the upper bound worst case risk management level stated in subsection 4.6.3.3.2.1.

**14 DE Reg. 1392 (06/01/11)**

### 2.0 Definitions

The following words and terms, when used in this regulation, shall have the following meaning unless the context clearly indicates otherwise:

**"Acute"** means involving a stimulus severe enough to rapidly induce an adverse response; in toxicity tests, an adverse response observed in 96 hours or less is typically considered acute. An acute effect is not always measured in terms of lethality; it can measure a variety of short term adverse effects.

**"Additive Effect"** means the total effect of a mixture of pollutants which is equal to the arithmetic sum of the effects of the individual pollutants in the mixture.

**"Agriculture"** means the use of land and water in the production of food, fiber and timber products.

**"Antagonistic Effect"** means the total effect of a mixture of pollutants which is less than the arithmetic sum of the effects of the individual pollutants in the mixture.

**"Average"** means, unless otherwise noted, the arithmetic mean of a representative group of samples for a specified parameter. Representativeness shall be determined through application of appropriate statistical techniques to data collected at times of critical ambient conditions, as determined on a parameter-by-parameter basis.

**"Best Management Practice (BMP)"** are methods, measures or practices that are determined by the Department to be reasonable and cost-effective means for a person to meet certain, generally nonpoint source, pollution control needs. BMPs include but are not limited to structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during or after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters.

**"Best Scientific Judgment"** means findings, conclusions, or recommended actions which result from the application of logical reasoning and appropriate scientific principles and practices to available and relevant information on a particular situation.

**"Bioavailability"** means a measure of the physicochemical access of a pollutant to an organism.

**"Biodegradation"** means the biological decomposition of natural or synthetic organic materials by microorganisms.

**"Carcinogen"** means a substance that increases the risk of benign or malignant neoplasms (tumors) in humans or other animals. Carcinogens regulated through these Standards include but may not be limited to those toxic substances classified as Group A or Group B carcinogens as defined in 51 FR 185 (9/24/86).

**"Chronic"** means involving a stimulus that produces an adverse response that lingers or continues for a relatively long period of time, often one-tenth of the life span or more. Chronic should be considered a relative term depending on the life span of the organism. A chronic effect can be lethality, growth or reproductive impairment, or other longer term adverse effect.

**"Clean Water Act"** means 33 U.S.C. 1251 et. seq., as amended.

**"Cold Water Fish Use"** means protection of fish species (such as from the family Salmonidae) and other flora and fauna indigenous to a cold water habitat.

**"Complete Mix"** means the concentration of a discharged pollutant varies by no more than 5% over the cross-sectional area of the receiving water at the point of discharge.

**"Conservation Plan"** means a conservation plan is a record of land user decisions affecting land use and conservation treatment of natural resources including soil, water, air, plant, and animal resources. It is comprised of resource management systems which are groups of interrelated conservation practices (BMPs) and management measures formulated to protect, restore, or improve the resource base. Conservation plans are usually developed with the assistance of conservation districts using district BMP standards (ref: Field Office Technical Guide, USDA Soil Conservation Service).

**"Control Structure"** means a dam, weir or other structure placed by man to regulate stream flow and/or create an impoundment.

**"Critical Flow"** means a statistically determined minimum flow, which has a defined duration and recurrence interval.

**"Degradation"** means any adverse change in water quality or existing uses.

**"Department"** means the Delaware Department of Natural Resources and Environmental Control.

**"Designated Uses"** means those uses specified in water quality standards for each water body or segment whether or not they are being attained.

**"Diadromous"** describes fish which migrate to and from marine water and freshwater for the purpose of spawning.

**"Discharge Length Scale"** means the square root of the cross-sectional area of any discharge outlet.

**"Dispersion"** means a physical mixing process which results in the scattering of particles or dissolved materials in the water column.

**"Early Life Stages"** means life stages for fish which include all embryonic and larval stages, and all juvenile forms to 30 days following hatching.

**"Ephemeral"** describes a stream which contains flowing water only for short periods following precipitation events.

**"Excavated Waters"** means waters of the State which are wholly human-created. Such waters shall include but not be limited to upland basins with surface outlets, drainage and tax ditches which are ephemeral, and dug ponds.

**"Existing Use"** means those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards.

**"Fish, Aquatic Life And Wildlife"** means all animal and plant life found in Delaware, either indigenous or migratory, regardless of life stage or economic importance.

**"Foam"** means frothy, generally stable, whitish mass of bubbles formed on or in the water upon agitation of the water.

"**Fresh Water"** means waters of the State which contain natural levels of salinity of 5 parts per thousand or less.

"**Fresh Water Flow"** means that flow which represents the amount of water passing a measurement point in a non-tidal system.

**"Harvestable Shellfish Waters"** means waters from which shellfish may be taken and consumed; such waters are approved for shellfish harvesting by the **[~~State Board of Health~~ Shellfish & Recreational Waters Branch, Watershed Assessment and Management Section, Division of Watershed Stewardship, Department of Natural Resources and Environmental Control]**.

**"Hydrolysis"** means a reaction of a chemical with water which results in the cleavage of a chemical bond.

**"Indigenous"** means native, or naturally growing, existing, or produced.

**"Industrial Water Supply"** means any water that is protected for use for industrial purposes, including non-contact cooling water.

**"Intake Water"** means water used by a facility from surface water, groundwater, commercial, or other sources.

**"Intermittent"** describes a stream which contains flowing water for extended periods during a year, but does not carry flow at all times.

**"Lethal Concentration (LC)"** means the point estimate of the toxicant concentration that would be lethal to a given percentage of test organisms during a specific period.

**"Marine Water"** mean waters of the State which contain natural levels of salinity in excess of 5 parts per thousand.

**"Migratory Fish Spawning and Nursery Designated Use"** means in the Nanticoke River from the upstream-most limits of the City of Seaford to the Maryland State Line and the Broad Creek from the upstream-most limits of the Town of Laurel to the confluence with the Nanticoke River, the survival, growth and propagation of balanced indigenous populations of ecologically, recreationally and commercially important anadromous, semi-anadromous and tidal-fresh resident fish inhabiting spawning and nursery grounds from February 1 through May 31

**"Minimum Analytical Level"** mean the lowest concentration of a substance that can be quantified within specified limits of interlaboratory precision and accuracy under routine laboratory operating conditions in the matrix of concern.

**"NPDES"** means National Pollutant Discharge Elimination System as provided in the Clean Water Act.

**"Natural Conditions"** means water quality characteristics found or expected in the absence of human-induced pollution due to point or nonpoint sources.

**"Net Advective Flow"** is that flow which represents the difference between the amount of water passing a point in a tidal system on a flood tide and the subsequent ebb tide. It is approximately equal to the freshwater input to the system upstream of that point.

**"Normal Corrosion"** means an ectrochemical reaction that results in the dissolution or removal of metal from a solid metal surface. For specific applications considered by the Department, normal corrosion rates shall be as published by the National Association of Corrosion Engineers (Reference: Corrosion Data Survey - Metals Section, National Association of Corrosion Engineers, 1985, as updated from time to time) or, for applications not specifically addressed in the above reference, such other reliable data.

**"Normal Erosion"** means the progressive loss of original material from a solid surface due to mechanical interaction between that surface and a fluid, a multi-component fluid or an impinging liquid or solid particle. (Reference: Standard Practice for Liquid Impingement Erosion Testing, ASTM Designation G73-82, 1987; or other authoritative source for materials or conditions not covered by the referenced standard).

**"Nuisance Condition"** means any condition that, as a result of pollutant addition to a stream, causes unreasonable interference with the designated uses of the waters or the uses of the adjoining land areas.

**"Nuisance Species"** mean any species of fish, other animal, or plant living in or near the water, the presence of which causes unreasonable interference with the designated uses of the waters or the uses of adjoining land areas. Nuisance species include but are not limited to filamentous and blue-green algae.

**"Nutrient"** means any element or compound essential as a raw material for organism growth and development, including but not limited to nitrogen and phosphorus.

**"One-hour Average"** means the arithmetic average of the samples collected during a continuous one-hour period.

**"Open-water Fish And Shellfish Designated Use"** means in the Nanticoke River from the upstream-most limits of the City of Seaford to the Maryland State Line and the Broad Creek from the upstream-most limits of the Town of Laurel to the confluence with the Nanticoke River, the survival, growth and propagation of balanced indigenous populations of ecologically, recreationally and commercially important fish and shellfish inhabiting open water habitats year round

**"Overenrichment"** means excessive addition of nutrients to a water body, resulting in deterioration of designated uses of the waters.

**"Perennial"** describes a freshwater stream which contains flowing water at all times.

**"Person"** means any individual, trust, firm, joint stock company, federal agency, partnership, corporation (including a government corporation), association, state, municipality, commission, political subdivision of a state, or any interstate body.

**"Photolysis"** means a light-catalyzed degradation reaction that occurs when light strikes certain chemicals.

**"Pollutant"** means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, hydrocarbons, oil and product chemicals, and industrial, municipal, and agricultural waste discharged into water.

**"Practicable"** means available and capable of being done after taking into consideration cost and existing technology, as well as logistics in light of overall facility operations or project purposes.

**"Primary Contact Recreation"** means any water-based form of recreation, the practice of which has a high probability for total body immersion or ingestion of water (examples include but are not limited to swimming and water skiing).

**“Propagation”** means reproduction of fish, aquatic life and wildlife within their natural environment.

**“Public Water Supply”** means any waters of the State designated as public water supply in Section 10.

**Regulatory Mixing Zone:** A designated, mathematically defined portion of a receiving water body, in close proximity to a discharge, in which initial dilution, dispersion, and reaction of discharged pollutants occur. See Section 6 for details on use of term.

**“Risk Management Level”** means that level above which an assessed risk is unacceptable from a public health perspective.

**“Scientifically Reasonable Request”** means any request that is based upon material, substantial, and relevant information and would be accepted as reasonable by most persons trained and competent in the subject of the request.

**“Scum”** describes a thin layer of impurities which forms on the surface of waters of the State.

**“Secondary Contact Recreation”** means a water-based form of recreation, the practice of which has a low probability for total body immersion or ingestion of water (examples include but are not limited to wading, boating, and fishing).

**“Sedimentation”** means the movement of solid particles and adsorbed chemicals toward the bottom of the water column under the influence of gravity.

**“Shallow-water Bay Grass Designated Use”** means in the Nanticoke River from the upstream-most limits of the City of Seaford to the Maryland State Line and the Broad Creek from the upstream-most limits of the Town of Laurel to the confluence with the Nanticoke River, the survival, growth and propagation of rooted, underwater bay grasses necessary for the propagation and growth of balanced indigenous populations of ecologically, recreationally and commercially important fish and shellfish inhabiting vegetated shallow-water habitats April 1 through October 31

“**Shellfish”** means any species of fresh, brackish or salt water mollusk that is commonly considered to be edible. Typical edible mollusks include but are not limited to clams, mussels, oysters, scallops, and whelks.

**“Stream Basin”** means a specified drainage area from which (in most cases) all waters exit through a single outlet.

**“Surface Water”** means water occurring generally on the surface of the earth.

**“Synergistic Effect”** means the total effect of a mixture of pollutants which is greater than the arithmetic sum of the effects of the individual pollutants in the mixture.

**“Systemic Toxicant”** means a toxic substance that has the ability to cause health effects within the body at sites distant from the entry point due to its absorption and distribution. Systemic toxicants are believed to have threshold concentrations or levels below which no health effects occur.

**“Tidal”** means surface waters characterized by periodic rise and fall due to gravitational interactions between the sun, moon, and earth.

**“Toxic Substance”** means any substance or combination of substances including disease-causing agents, 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, may cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformities in such organisms or their offspring.

**“Toxicity”** means the ability to cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformities in organisms or their offspring.

**“Toxicity Test”** is the means to determine the toxicity of a chemical or effluent using living organisms. A toxicity test measures the degree of response of an exposed test organism to a specific chemical or effluent.

**“True Daily Mean”** is the mean value for a parameter which accurately accounts for diurnal variations over one 24-hour period.

“**Use Attainability Analysis”** means a structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological, and economic factors as described in Sections 9.1.1.1 though 9.1.1.8).

**“Volatilization”** means the loss of a chemical from the water column due to mass exchange across the air-water interface.

**“Water Distribution Piping and Appurtenances”** means pipes and piping systems, along with integral components thereof, which are used to convey water from one point to another.

**“Water Pollution”** means man-made or human-induced alteration of the chemical, physical, biological or radiological integrity of surface waters of the State.

“**Waters of the State”** means:

All surface waters of the State including but not limited to:

Waters which are subject to the ebb and flow of the tide, including but not limited to estuaries, bays, and the Atlantic Ocean;

All interstate waters, including interstate wetlands;

All other waters of the State, such as lakes, rivers, streams (including intermittent and ephemeral streams), drainage ditches, tax ditches, creeks, mudflats, sandflats, wetlands, sloughs, or natural or impounded ponds;

All impoundments of waters otherwise defined as waters of the State under this definition;

Wetlands adjacent to waters (other than waters that are themselves wetlands) identified above;

Waste and stormwater treatment systems, including but not limited to treatment ponds or lagoons designed to meet the requirements of the Clean Water Act (other than cooling ponds which otherwise meet the requirements of subsection (l) of this definition) are not waters of the State.

Waters of exceptional recreational or ecological significance (ERES): Waters which are important, unique, or sensitive from a recreational and/or ecological perspective, but which may or may not have excellent water quality. Such waters shall normally have regional significance with respect to recreational use (fishing, swimming and boating), or have significant or widespread riverine, riparian, or wetland natural areas.

**"Water Quality"** mean the physical, chemical, and biological characteristics of water with respect to its suitability for a particular use. For the purposes of these Standards, water quality shall be assessed in terms of chemical composition, biological integrity, and physical habitat.

**"Water-Quality Based"** generally refers to requirements for pollution control that are in excess of technology-based minimum requirements, including but not limited to those listed in Sections 301(b) and 306 of the Clean Water Act. Such controls are designed to reduce pollutants to a level that will allow water quality standards to be attained where said standards would not be attained through application of the technology-based controls.

**"Water Quality Criterion"** means an element of water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular designated use.

**"Water Quality Standard"** means a rule or limit defined herein which consists of a designated use or uses for waters of the State and water quality criteria for such waters based upon such designated uses.

**["Wetland Dominated Tidal River Designated Use" applies to the Murderkill River from the Route 1 Bridge to the confluence with Delaware Bay which supports the survival, growth and propagation of balanced indigenous populations of fish inhabiting the river and adapted to intermittent low dissolved oxygen caused by natural processes during the period May 16 through September 30.]**

"**Wetlands"** means wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

## 3.0 Stream Basins & Designated Uses

The designated uses applicable to the various stream basins represent the categories of beneficial use of waters of the state which must be maintained and protected through application of appropriate criteria.

| Basins and waterbodies as illustrated in Figure 1 | | Public Water Supply Source | Industrial Water Supply | Primary Contact Recreation | Secondary Contact Recreation | Fish, Aquatic Life & Wildlife** | Cold Water Fish (Put-and-Take) | Agricultural Water Supply | ERES Waters* | Harvestable Shellfish Waters |
|---|---|---|---|---|---|---|---|---|---|---|
| # | Name | | | | | | | | | |
| 1 | Naamans Creek | - | x | x | x | x | - | (a) | - | - |
| 2 | Shellpot Creek | - | x | x | x | x | - | (a) | - | - |
| 3 | Brandywine Creek | (a) | x | x | x | x | (b) | (a) | (h) | - |
| 4 | Red Clay Creek | x | x | x | x | x | (e) | x | q | - |
| 5 | White Clay Creek | (a) | x | x | x | x | (f) | (a) | (g) | - |
| 6 | Christina River | (a) | x | x | x | x | (c) | (a) | - | - |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Delaware River | - | - | x | x | x | - | (a) | - | - |
| 8 | Army Creek | - | - | x | x | x | - | (a) | - | - |
| 9 | Red Lion Creek | (a)(i) | x | x | x | x | - | (a) | - | - |
| 10 | Dragon Run Creek | (a) | x | x | x | x | - | (a) | - | - |
| 11 | Chesapeake & Delaware Canal East | - | x | x | x | x | - | - | - | - |
| 12 | Appoquinimink River | - | x | x | x | x | - | (a) | - | - |
| 13 | Blackbird Creek | - | x | x | x | x | - | (a) | - | - |
| 14 | Delaware Bay | - | x | x | x | x | - | (a) | | |
| 15 | Smyrna River | - | x | x | x | x | - | (a) | - | - |
| 16 | Leipsic River | - | x | x | x | x | - | (a) | - | - |
| 17 | Little Creek | - | x | x | x | x | - | (a) | - | - |
| 18 | St. Jones River | - | x | x | x | x | - | (a) | - | - |
| 19 | Murderkill River | - | x | x | x | x **[(r)]** | - | (a) | - | - |
| 20 | Mispillion River | - | x | x | x | x | | (a) | | |
| 21 | Cedar Creek | - | x | x | x | x | - | (a) | (d) | - |
| 22 | Broadkill River (k) | - | x | x | x | x | - | (a) | - | - |
| 23 | Elk Creek | - | x | x | x | x | - | x | - | - |
| 24 | Perch Creek | - | x | x | x | x | - | x | - | - |
| 25 | Chesapeake & Delaware Canal West | - | x | x | x | x | - | - | - | - |
| 26 | Bohemia Creek | - | x | x | x | x | - | x | - | - |
| 27 | Sassafras River | - | x | x | x | x | - | x | - | - |
| 28 | Chester River | - | x | x | x | x | - | x | - | - |
| 29 | Choptank River | - | x | x | x | x | | x | - | |
| 30 | Marshyhope Creek | - | x | x | x | x | - | x | x | - |
| 31 | Nanticoke River | - | x | x | x | x (p) | - | (a) | x | - |
| 32 | Gum Branch | - | x | x | x | x | - | (a) | x | - |
| 33 | Gravelly Branch | - | x | x | x | x | - | (a) | x | - |
| 34 | Deep Creek | - | x | x | x | x | - | (a) | x | - |
| 35 | Broad Creek | - | x | x | x | x (p) | - | (a) | x | - |
| 36 | Wicomico | - | x | x | x | x | - | (a) | x | - |
| 37 | Pocomoke River | - | x | x | x | x | - | x | - | - |
| 38 | Lewes & Rehoboth Canal | - | x | x | x | x | - | - | - | - |
| 39 | Rehoboth Bay | - | x | x | x | x | - | (a) | x | (j) |
| 40 | Indian River | - | x | x | x | x | - | (a) | (d) | - |
| 41 | Iron Branch | - | x | x | x | x | - | (a) | (d) | - |
| 42 | Indian River Bay | - | x | x | x | x | - | (a) | x | (j) |
| 43 | Buntings Branch | - | - | x | x | x | - | x | - | - |
| 44 | Assawoman | - | - | x | x | x | - | (a) | **x**- | - |
| 45 | Little Assawoman Bay | - | x | x | x | x | - | (a) | x | - |
| | Delaware Bay (waterbody) (l), (n) | - | x | x | x | x | - | - | (m) | (j) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Delaware River (Waterbody) (l),(o) | - | x | x | x | x | - | - | - | - |
| | Atlantic Ocean (waterbody) | - | x | x | x | x | - | - | (m) | |

(a) Designated use for freshwater segments only.

(b) Designated use from March 15 to June 30 on:

1. Beaver Run from PA/DE line to Brandywine.
2. Wilson Run Route 92 through Brandywine Creek State Park.

(c) Designated use from March 15 to June 30 on:

1. Christina River from MD/DE line through Rittenhouse Park.

(d) Designated use for marine water segments only.

(e) Designated use year round on:

1. Red Clay Creek from PA/DE line to the concrete bridge above Yorklyn

(f) Designated use year round on:

1. White Clay Creek from the PA/DE line to the dam at Curtis Paper.

Designated use from March 15 to June 30 on:

2. Mill Creek from Brackenville Road to Route 7.
3. Pike Creek from Route 72 to Henderson Road.

(g) Designated use from PA/DE line to the dam at Curtis Paper.

(h) Designated use from PA/DE line to Wilmington city line.

(i) Goal use - not currently attained.

(j) Parts of these waters are APPROVED shellfish harvesting areas. Information on areas where shellfish may be taken should be obtained from the Shellfish & Recreational Waters Branch, Watershed Assessment Section, Division of Water Resources, Department of Natural Resources and Environmental Control.

(k) Includes Primehook Creek watershed.

(l) Includes assorted minor watersheds not explicitly associated with any other designated stream basin.

(m) The specific portions of the Atlantic Ocean and the Delaware Bay for which the ERES designation shall apply shall be delineated in the Pollution Control Strategy developed for each of those waterbodies. The ERES designation for the Atlantic Ocean and the Delaware Bay does not include water explicitly associated with any other designated stream basis (e.g., Delaware Bay does not include St. Jones River).

(n) The Delaware Bay extends from River Mile 0.0 to 48.2 as shown on Figure 1.

(o) The Delaware River extends from River Mile 48.2 to 78.8 as shown in Figure 1.

(p) The Nanticoke River from the upstream-most limits of the City of Seaford to the Maryland State Line and the Broad Creek from the upstream-most limits of the Town of Laurel to the confluence with the Nanticoke River have special criteria in Section 4.5 that are protective of open water fish and shellfish, shallow-water bay grass and migratory fish spawning and nursery designated uses consistent with the Maryland portion of the tidal Nanticoke River and as described in the U.S. Environmental Protection Agency document Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for the Chesapeake Bay and its Tidal Tributaries (EPA 903-R-03-002). Attainment of the water quality criteria that apply to these waters will be determined following the guidelines documented within the same document and any future published addendums or modifications to that original publication.

(q) ERES designation is for Burrows Run from the Pennsylvania Line to the confluence with Red Clay Creek

**[(r) The Murderkill River from the Route 1 Bridge to the confluence with Delaware Bay has special dissolved oxygen criteria in section 4.5 that are protective of the wetland dominated tidal river designated use.]**

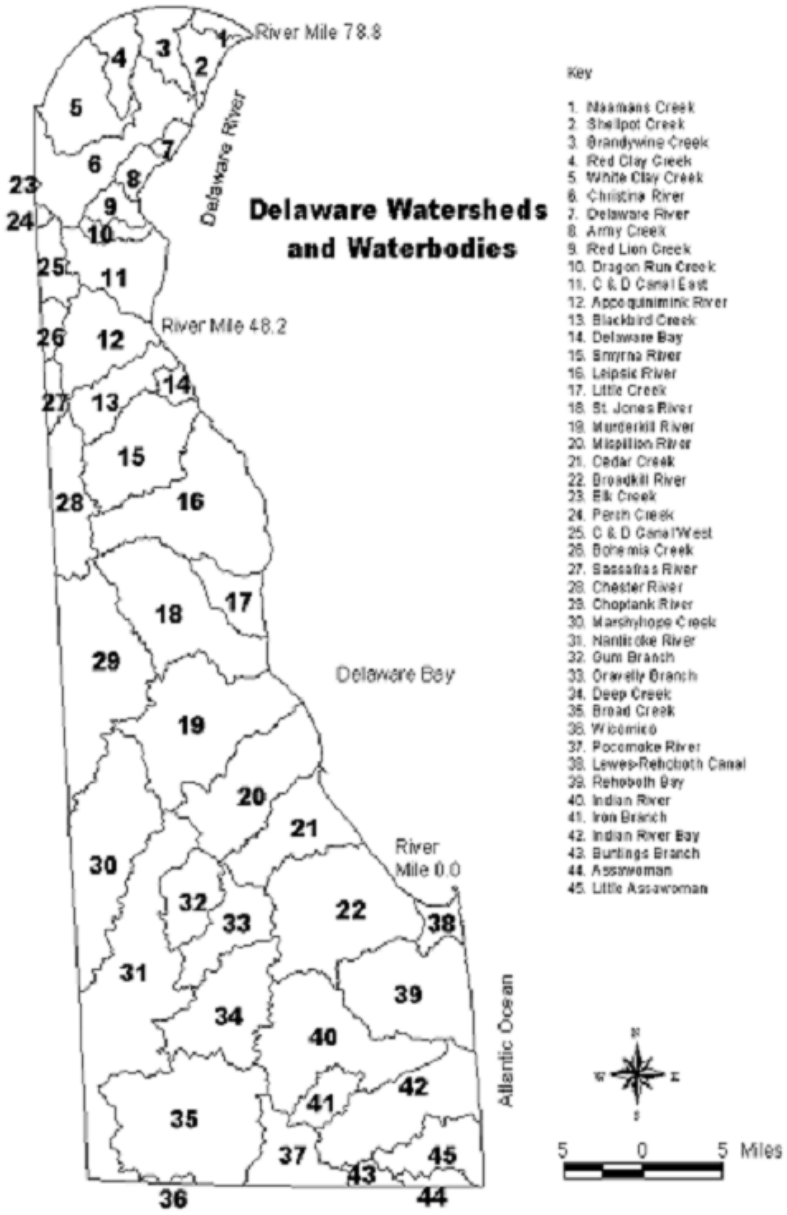
x his designated water use to be protected throughout entire stream basin

\- water uses not designated in the stream basin

* waters of exceptional recreational or ecological significance

** includes shellfish propagation

**Figure 1 Delaware Watersheds and Waterbodies**




Basin Boundaries to be used in determination of standards applicability are on file with the DNREC Division of Water Resources.

## 4.0 Criteria To Protect Designated Uses

4.1 All surface waters of the State (except as detailed in Sections 7 and 8) shall meet the following minimum criteria:

4.1.1 Waters shall be free from substances that are attributable to wastes of industrial, municipal, agricultural or other human-induced origin. Examples include but are not limited to the following:

4.1.1.1 Floating debris, oil, grease, scum, foam, or other materials on the water surface that may create a nuisance condition, or that may in any way interfere with attainment and maintenance of designated uses of the water,

4.1.1.2 Settleable solids, sediments, sludge deposits, or suspended particles that may coat or cover submerged surfaces and create a nuisance condition, or that may in any way interfere with attainment and maintenance of designated uses of the water,

4.1.1.3 Any pollutants, including those of a thermal, toxic, corrosive, bacteriological, radiological, or other nature, that may interfere with attainment and maintenance of designated uses of the water, may impart undesirable odors, tastes, or colors to the water or to aquatic life found therein, may endanger public health, or may result in dominance of nuisance species.

4.2 Narrative Criteria for Waters With the Public Water Supply Designated Use

4.2.1 Streams with a designated use of public water supply shall provide waters of acceptable quality for use for drinking, culinary or food processing purposes after application of approved treatment equivalent to coagulation, filtration, and disinfection (with additional treatment as necessary to remove naturally occurring impurities). The untreated waters are subject to the following limitations:

4.2.1.1 Waters shall be free from substances (except natural impurities) that, alone or in combination with other substances, result in:

4.2.1.1.1 Unacceptable levels of taste or odor in the treated water;

4.2.1.1.2 Significant disruption of the treatment processes at the treatment facility; or

4.2.1.1.3 Concentrations of toxic substances in the treated water that may be harmful to human health. The requirements of Section 4.6.3 shall apply.

4.3 Certain waters of the State are subject to natural variations in salinity such that those waters meet the definition of fresh at some times and marine at other times. For such waters, the more stringent of fresh or marine water quality criteria or standards as detailed throughout this document shall apply at all times unless otherwise specified by the Department.

4.4 Coordination with Delaware River Basin Commission:

For waters of the Delaware River and Delaware Bay, duly adopted Delaware River Basin Commission (DRBC) Water Quality Regulations shall be the applicable criteria. If the DRBC has not developed an applicable regulatory standard or criteria for these waters, and Delaware has, Delaware's criteria shall be applicable.

4.5 The following criteria shall apply outside approved regulatory mixing zones unless otherwise specified:

4.5.1 Temperature, measured as Fahrenheit Degrees

4.5.1.1 Fresh Waters

4.5.1.1.1 Maximum increase above natural conditions shall be $5^{o}$F.

4.5.1.1.2 No human-induced increase of the true daily mean temperature above 82 $^{o}$F shall be allowed.

4.5.1.1.3 No human-induced increase of the daily maximum temperature above 86$^{o}$F shall be allowed.

4.5.1.2 Marine Waters

4.5.1.2.1 Maximum increase above natural conditions shall be 4 $^{o}$F from October through May. Temperature rise during June through September shall be limited by the following conditions:

4.5.1.2.2 No human-induced increase of the true daily mean temperature above 84 $^{o}$F shall be allowed; and

4.5.1.2.3 No human-induced increase of the daily maximum temperature above 87$^{o}$F shall be allowed.

4.5.1.3 Cold Water Fisheries (Put and Take)

4.5.1.3.1 Maximum increase above natural conditions shall be 5 $^{o}$F.

4.5.1.3.2 No human-induced increase of the true daily mean temperature above 75 $^{o}$F, shall be allowed

4.5.1.4 In all waters of the state, the Department may mandate additional limitations on a site-specific or seasonal basis in order to provide incremental protection for early life stages of fish.

4.5.2 Dissolved Oxygen, measured as milligrams per liter (mg/L)

4.5.2.1 Fresh Waters

4.5.2.1.1 Daily average shall not be less than 5.5 mg/L.

4.5.2.1.2 Instantaneous minimum shall not be less than 4.0 mg/L

4.5.2.2 Marine Waters

4.5.2.2.1 Daily average shall not be less than 5.0 mg/L.

4.5.2.2.2 Instantaneous Minimum shall not be less than 4.0 mg/L

4.5.2.3 Cold Water Fisheries (Put and Take)

4.5.2.3.1 Daily average shall not be less than 6.5 mg/L during the applicable period.

4.5.2.3.2 Instantaneous Minimum shall not be less than 5.0 mg/L during the applicable period.

4.5.2.4 The Nanticoke River from the upstream-most limits of the City of Seaford to the Maryland State Line and Broad Creek from the upstream-most limits of the Town of Laurel to the confluence with the Nanticoke River

At water temperatures greater than 84 degrees Fahrenheit, instantaneous minimum shall not be less than 4.3 mg/L

4.5.2.4.1 For the period February 1- May 31:

4.5.2.4.1.1 7-Day mean shall not be less than 6.0 mg/L

4.5.2.4.1.2 Instantaneous minimum shall not be less than 5.0 mg/L

4.5.2.4.2 For June 1- January 31

4.5.2.4.2.1 30 Day mean shall not be less than 5.5 mg/L

4.5.2.4.2.2 7-Day mean shall not be less than 4.0 mg/L

4.5.2.4.2.3 Instantaneous minimum shall not be less than 3.2 mg/L

4.5.2.5 ~~All Waters~~ The Murderkill River from the Route 1 Bridge to the Confluence with the Delaware Bay

4.5.2.5.1 ~~In cases where natural conditions prevent attainment of these criteria, allowable reduction in dissolved oxygen levels as a result of human activities shall be determined through application of the requirements of Sections 5 and 9 of these Standards.~~ For the period from May **[~~15~~ 16]** through September 30:

4.5.2.5.1.1 Daily average shall not be less than 3.0 mg/L

4.5.2.5.1.2 **[~~Instantaneous~~ One Hour]** Minimum: one hour average shall not be less than 1.0 mg/L

4.5.2.5.2 ~~The Department may mandate additional limitations on a site-specific or seasonal basis in order to provide incremental protection for early life stages of fish.~~ For the period October 1 through **[~~April 30~~ May 15]**, applicable criteria for all waters of the State shall apply.

4.5.2.6 All Waters

4.5.2.6.1 In cases where natural conditions prevent attainment of these criteria, allowable reduction in dissolved oxygen levels as a result of human activities shall be determined through application of the requirements of Sections 5 and 9 of these Standards.

4.5.2.6.2 The Department may mandate additional limitations on a site specific or seasonal basis in order to provide incremental protection for early stages of fish.

4.5.3 pH, measured in standard units, in all waters of the state

4.5.3.1 Shall be between 6.5 and 8.5 unless outside this range due solely to natural conditions. Where within this range, maximum human-induced change from background shall be 0.5 Standard Units; pH which results from human-induced change must remain within this range.

4.5.3.2 Where pH is below 6.5 or above 8.5 due solely to natural conditions, it shall not be lowered (where below 6.5) or raised (where above 8.5) more than 0.3 Standard Units due to human-induced changes.

4.5.4 Alkalinity, measured as mg/L as CaCO3, in all waters of the State shall not be less than 20 mg/L unless due solely to natural conditions. If less than 20 mg/L due solely to natural conditions, no reduction due to human-induced changes is allowed.

4.5.5 Turbidity Measured as Nephelometric or Formazin Turbidity Units, in all waters of the State shall not exceed natural levels by more than 10 units.

4.5.6 Water Clarity in the ~~The~~ Nanticoke River from the upstream-most limits of the City of Seaford to the Maryland State Line and Broad Creek from the upstream-most limits of the Town of Laurel to the confluence with the Nanticoke River:

During the period of April 1 to October 31 the minimum seasonal averaged secchi depth shall be 1.0 m.

4.5.6.1 Chlorophyll-*a* criteria for the Nanticoke River from the upstream-most limits of the City of Seaford to the Maryland State Line and Broad Creek from the upstream-most limits of the Town of Laurel to the confluence with the Nanticoke River:

Concentrations of chlorophyll-*a* in free-floating microscopic aquatic plants (algae) shall not exceed levels that result in ecologically undesirable consequences - such as reduced water clarity, low dissolved oxygen, food supply imbalances, proliferation of species deemed potentially harmful to aquatic life or humans or aesthetically objectionable conditions or otherwise render tidal waters unsuitable for designated uses.

4.5.7 Bacterial Water Quality Criteria

4.5.7.1 Primary and Secondary Contact Recreation Waters:

The following criteria shall apply:

| Waterbody Type | Single-Sample Value (Enterococcus Colonies/100ml) | Geometric Mean (Enterococcus Colonies/ 100ml) |
|---|---|---|
| Primary Contact Recreation Fresh Waters | 185 | 100 |
| Primary Contact Recreation Marine Waters | 104 | 35 |
| Secondary Contact Recreation Fresh Waters | 925 | 500 |
| Secondary Contact Recreation Marine Waters | 520 | 175 |

The purpose of these criteria is to provide the Department with a basis to assess water quality trends and pollution control needs with regard to primary and secondary contact recreation in waters of the State and to meet Federal BEACH Act Requirements. The criteria apply to enterococcus bacteria determined by the Department to be of non-wildlife origin based on best scientific judgment using available information. Swimming in waters affected by runoff during runoff periods may present an elevated risk of gastrointestinal illness and is not recommended.

4.5.7.2 Harvestable Shellfish waters:

The total coliform median MPN of the water shall not exceed 70/100 mL, nor shall more than 10% of the samples have an MPN in excess of 330/100 mL for a 3 decimal dilution test (or 230/100 mL where the 5 tube decimal test is used). These criteria shall be verified through sampling of those portions of the shellfish area most probably exposed to fecal contamination for those tidal and climatic conditions most likely to result in contamination of the shellfish area.

4.5.8 Nutrients

Nutrient overenrichment is recognized as a significant problem in some surface waters of the State.

4.5.8.1 It shall be the policy of this Department to minimize nutrient input to surface waters from point and human induced non-point sources.

4.5.8.2 The types of, and need for, nutrient controls shall be established on a site-specific basis. Nutrient controls may include, but shall not be limited to, discharge limitations or institution of best management practices.

4.5.8.3 For lakes and ponds, controls shall be designed to eliminate overenrichment.

4.5.8.4 For tidal portions of the stream basins of Indian River, Rehoboth Bay, and Little Assawoman Bay, controls needed to attain submerged aquatic vegetation growth season (approximately March 1 to October 31) average levels for dissolved inorganic nitrogen of 0.14 mg/L as N, for dissolved inorganic phosphorus of 0.01 mg/L as P, and for total suspended solids of 20 mg/L shall be instituted.

4.5.8.5 The specific measures to be employed by existing NPDES facilities to meet the aforementioned criteria shall be as specified in Section 5.6.3.4 of these standards.

4.5.9 Toxic Substances

4.5.9.1 Applicability: Criteria set forth in this section apply to all surface waters of the State, except as provided in Section 6, Regulatory Mixing Zones, Section 7, Critical Flows, and Section 8, Criteria for Low Flow Waters.

4.5.9.2 General Provisions:

4.5.9.2.1 Waters of the State shall not exhibit acute toxicity to fish, aquatic life, and wildlife, except in special cases applying to regulatory mixing zones as provided in Section 6.

4.5.9.2.2 Waters of the State shall not exhibit chronic toxicity to fish, aquatic life, and wildlife, except in regulatory mixing zones as provided in Section 6, at flows less than critical flows as provided in Section 7, or in low flow waters as provided in Section 8.

4.5.9.2.3 Waters of the State shall be maintained to prevent adverse toxic effects on human health resulting from ingestion of chemically contaminated aquatic organisms and drinking water.

4.5.9.2.4 The Department may consider synergistic, antagonistic, and additive impacts of combinations of toxicants to fish, aquatic life, and wildlife, and human health in assessing aggregate environmental impacts and mandating point and nonpoint source controls.

4.5.9.3 Specific Numerical Criteria:

4.5.9.3.1 Aquatic Life Criteria:

4.5.9.3.1.1 Aquatic Life Criteria for Aluminum, Iron, and Selenium in Table 1 are expressed on a total recoverable basis. Criteria for Cyanide in Table 1 are expressed as free cyanide at the lowest pH occurring in the receiving water, or cyanide amenable to chlorination. Criteria for all other metals in Table 1 are expressed on a total dissolved basis. For toxic substances where the relationship of toxicity is defined as a function of pH or hardness, numerical criteria are presented as an equation based on this relationship. Appropriate pH or hardness values for such criteria shall be determined on a case-by-case basis by the Department.

4.5.9.3.1.2 Specific numerical acute criteria as presented in Table 1 are applied as one-hour average concentrations not to be exceeded more than once in any three-year period. Specific numerical chronic criteria as presented Table 1 are applied as four-day average concentrations not to be exceeded more than once in any three-year period.

4.5.9.3.1.3 For toxic substances for which specific numerical criteria are not listed in Table 1, concentrations shall not exceed those which are chronically toxic (as determined from appropriate chronic toxicity data or calculated as 0.1 of LC50 values) to representative, sensitive aquatic organisms, except as provided in Section 6, Regulatory Mixing Zones, Section 7, Critical Flows, or Section 8, Criteria for Low Flow Waters. Concentrations so determined shall be applied as four-day average concentrations not to be exceeded more than once in any three-year period.

4.5.9.3.2 Human Health Criteria

4.5.9.3.2.1 Water quality criteria appearing in Table 2 for pollutants identified as carcinogens have been established at an upper bound worst case risk management level of one excess cancer in a population of one million ($1 \times 10^{-6}$) over a 70 year lifetime. Criteria listed under the columns header "Fish and Water Ingestion" apply only to surface waters of the State designated as Public Water Supply Sources in Section 3 of these Standards. Criteria listed under columns headed "Fish Ingestion Only" apply to all surface waters of the State not designated as Public Water Supply Sources in Section 3 of these Standards.

4.5.9.3.2.2 For compounds in Table 2 which are considered as both systemic toxicants and human carcinogens, criteria based on both human health concerns are presented. In determining pollution control requirements, the more stringent criterion, after consideration of critical (design) flows in Section 7, shall be utilized.

**TABLE 1**
**WATER QUALITY CRITERIA FOR PROTECTION OF AQUATIC LIFE**
(All Values Are Listed or Calculated in Micrograms Per Liter)

| Parameter | Fresh Acute Criterion | Fresh Chronic Criterion | Marine Acute Criterion | Marine Chronic Criterion |
|---|---|---|---|---|
| Aldrin | 3.0 | -- | 1.3 | -- |
| Acrolein | 3.0 | 3.0 | | |
| Aluminum pH6.5-9.0 | 750. | 87. | -- | -- |
| Ammonia | Temperature and pH dependent, see formula after this table | Temperature and pH dependent, see formula after this table | | |

| | | | | |
|---|---|---|---|---|
| Arsenic (III)* | 340. | 150 | 69. | 36. |
| Cadmium* | (1.136672-LN(hardness)*0.041838)* EXP(1.0166*LN(hardness)-3.924) | (1.101672-LN(hardness)*0.041838)* EXP(0.7409*LN(hardness)-4.719) | 40. | 8.8 |
| Carbaryl | 2.1 | 2.1 | 1.6 | |
| Chlordane | 2.4 | 0.0043 | 0.09 | 0.004 |
| Chlorine | 19 | 11. | 13 | 7.5 |
| Chlorpyrifos (Dursban) | 0.083 | 0.041 | 0.011 | 0.0056 |
| Chromium (III)* | 0.316*EXP(0.819*LN(hardness)+3.7256) | 0.86*EXP(0.819*LN(hardness)+0.6848) | C | -- |
| Chromium (VI)* | 16. | 11. | 1,100. | 50. |
| Copper* | ~~0.96*EXP(0.9422*LN(hardness)-1.7)~~ Freshwater criteria calculated using the EPA Biotic Ligand Model | ~~0.96*EXP(0.8545*LN(hardness)-1.702)~~ Freshwater criteria calculated using the EPA Biotic Ligand Model | 4.8 | 3.1 |
| Cyanide[1] | 22. | 5.2 | 1.0 | -- |
| DDT and Metabolites (DDD and DDE) | 1.1 | 0.0010 | 0.13 | 0.0010 |
| Demeton | -- | 0.10 | -- | 0.10 |
| Diazanon | 0.17 | 0.17 | 0.82 | 0.82 |
| Dieldrin | 0.24 | .056 | 0.71 | 0.0019 |
| Endosulfan | 0.22 | 0.056 | 0.034 | 0.0087 |
| Endrin | .086 | .036 | 0.037 | 0.0023 |
| Guthion | -- | 0.01 | -- | 0.01 |
| Heptachlor | 0.52 | 0.0038 | 0.053 | 0.0036 |
| Hexachloro-cylclohexane | .095 | 0.08 | 0.16 | -- |
| Iron | -- | 1000. | -- | -- |
| Lead* | (1.46203-LN(hardness)*0.145712)* EXP(1.273*LN(hardness)-1.460) | (1.46203-LN(hardness)*0.145712)* EXP(1.273*LN(hardness)-4.705) | 210. | 8.1 |
| Malathion | -- | 0.1 | -- | 0.1 |
| Mercury (II)* | 1.4 | .77 | 1.8 | 0.94 |
| Methoxychlor | -- | 0.03 | -- | 0.03 |
| Mirex | -- | 0.001 | C | 0.001 |
| Nickel* | 0.998*EXP(0.8460*LN(hardness)+2.255) | 0.997*EXP(0.8460*LN(hardness)+0.0584) | 74. | 8.2 |
| Total PCBs | | 0.014 | | 0.03 |
| Parathion | 0.065 | 0.013 | -- | -- |
| Pentachlorophenol | EXP(1.005*pH-4.869) | EXP(1.005*pH-5.134) | 13. | 7.9 |
| Selenium | 20 | 5.0 | 290 | 71. |

| | | | | |
|---|---|---|---|---|
| Silver* | $0.85*EXP^{(1.72*LN(hardness)-6.59)}$ | -- | 1.9 | -- |
| Toxaphene | 0.73 | 0.0002 | 0.21 | 0.0002 |
| Tributyltin (TBT) | 0.46 | 0.072 | 0.42 | 0.0074 |
| Zinc* | $0.978*EXP^{(0.8473*LN(hardness)+0.884)}$ | $0.986*EXP^{(0.8473*LN(hardness)+0.884)}$ | 90 | 81 |

Notes:

[1]Cyanide measured as free cyanide at the lowest pH occurring in the receiving water, or cyanide amenable to chlorination.

Formulas in the table have been formatted so that they can be copied directly into spreadsheets to calculate criteria. Criteria are calculated to two significant figures.

LN = natural log base e

EXP = e = 2.71828

Hardness is expressed as mg/L as $CaCO_3$

pH is expressed as Standard Units

* Criteria is for total dissolved form

**Calculation of Freshwater Acute Ammonia Criterion**:

Where salmonid fish are present:

$$\text{Criterion} = \frac{0.275}{1 + 10^{7.204-pH}} + \frac{39.0}{1 + 10^{pH-7.204}}$$

Or where salmonid fish are not present:

$$\text{Criterion} = \frac{0.411}{1 + 10^{7.204-pH}} + \frac{58.4}{1 + 10^{pH-7.204}}$$

**Calculation of Freshwater Chronic Ammonia Criterion**:

The thirty-day average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the chronic criterion calculated using the following equations.

When fish early life stages are present:

$$\text{Criterion} = \frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} * \text{MIN}\left(2.85, 1.45 * 10^{0.028*(25-T)}\right)$$

When fish early life stages are absent:

$$\text{Criterion} = \frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} * \left[1.45\ 10^{0.028*(25-\text{MAX}(T,7))}\right]$$

**Additional Freshwater Chronic Ammonia Criterion**:

The highest four-day average within the 30-day period shall not exceed 2.5 times the chronic criterion.

**TABLE 2**
**WATER QUALITY CRITERIA FOR PROTECTION OF HUMAN HEALTH**
(All Values Are Listed in Micrograms per Liter)

| Chemical | Systemic Toxicants | | Human Carcinogens | |
|---|---|---|---|---|
| | Fish Ingestion | Fish and Water Ingestion | Fish Ingestion | Fish and Water Ingestion |
| Acenaphthene | 990 | 670 | | |
| Acrolein | 9.3 | 6.1 | | |

| | | | | |
|---|---|---|---|---|
| Acrylonitrile | | | 0.25 | 0.051 |
| Aldrin | 0.025 | 0.025 | 0.00005 | 0.000049 |
| Anthracene | 40000 | 8300 | | |
| Antimony | 1600 | 6 (MCL) | | |
| Arsenic (inorganic) | | 10 (MCL) | | |
| Asbestos | | 7 million fibers/L (MCL) | | |
| barium | | 2000 (MCL) | | |
| Benzene | 3100 | 5 (MCL) | 14 | 0.61 |
| Benzidine | 140 | 59 | 0.00019 | 0.000086 |
| Benzo(a)Anthracene | | | 0.18 | 0.038 |
| Benzo(a)Pyrene | | 0.2 (MCL) | 0.018 | 0.0038 |
| Benzo(b)Fluoranthene | | | 0.18 | 0.038 |
| Beryllium | 420 | 4 (MCL) | 0.024 | 0.0034 |
| Bis(2-Chloroethyl)Ether | | | 0.53 | 0.03 |
| Bis(2-Chloroisopropyl)Ether | 65000 | 1400 | | |
| Bis(2-Ethylhexyl)Phthalate | 620 | 6 (MCL) | 2.2 | 1.2 |
| Bromoform | 9600 | 650 | 61 | 4.1 |
| Butylbenzyl Phthalate | 1900 | 1500 | | |
| Cadmium | 31 | 5 (MCL) | | |
| Carbon Tetrachloride | ~~150~~ 850 | 5 (MCL) | ~~1.6~~ 3.0 | ~~0.23~~ 0.43 |
| Chlordane | 0.14 | 0.14 | 0.00081 | 0.0008 |
| Chlorobenzene | 7800 | 100 (MCL) | | |
| Chlorodibromomethane | 21000 | 680 | 13 | 0.4 |
| Chloroform | 11000 | 340 | | |
| 2-Chloronaphthalene | 1600 | 1000 | | |
| 2-Chlorophenol | 150 | 81 | | |
| Chromium (III) | 380000 | 100 (MCL) | | |
| Chromium (VI) | 750 | 92 | | |
| Chromium | | 100 (MCL) | | |
| Chrysene | | | 0.18 | 0.038 |
| Copper | | 1300 (MCL) | | |
| Cyanide | ~~80000~~ 2400 | ~~200~~ 21 | | |
| DDT and Metabolites (DDD and DDE) | 0.037 | 0.037 | 0.00022 | 0.00022 |
| Dibenzo(a,h)Anthracene | | | 0.018 | 0.0038 |
| 1,2-Dichlorobenzene | 6500 | 600 (MCL) | | |
| 1,3-Dichlorobenzene | 1300 | 350 | | |
| 1,4-Dichlorobenzene | 1400 | 75 (MCL) | | |
| 3,3'-Dichlorobenzidine | | | 0.028 | 0.021 |
| Dichlorobromomethane | | 680 | 17 | 0.55 |

| | | | | |
|---|---|---|---|---|
| 1,2-Dichloroethane | | 5 (MCL) | 37 | 0.38 |
| 1,1-Dichloroethylene | 36000 | 7 (MCL) | 1.2 | 0.056 |
| Dichloromethane | ~~260000~~ 27000 | 5 (MCL) | ~~590~~ 2200 | ~~4.6~~ 17 |
| 2,4-Dichlorophenol | 290 | 77 | | |
| 2,4 Dichlorophenoxyacetic acid (2,4-D) | | 70 (MCL) | | |
| 1,2 Dichloropropane | | | 15 | 0.5 |
| 1,3-Dichloropropene | 63000 | 1000 | 42 | 0.69 |
| Dieldrin | 0.043 | 0.041 | 0.000054 | 0.000052 |
| Diethyl Phthalate | 44000 | 17000 | | |
| Dimethyl Phthalate | 1100000 | 270000 | | |
| 2,4-Dimethylphenol | 850 | 380 | | |
| Di-n-Butyl Phthalate | 4500 | 2000 | | |
| 2,4-Dinitrophenol | 5300 | 69 | | |
| 2,4-Dinitrotoluene | 2100 | 68 | 3, 4 | 0.11 |
| 2,3,7,8-TCDD (Dioxin) (as TEQ[1]) | 0.000000 6 | ~~0.00003 (MCL)~~ .0000005 | 5.1E-09 | 5.0 E-09 |
| 1,2-Diphenylhydrazine | | | 0.2 | 0.036 |
| Endosulfan | 89 | 62 | | |
| Endrin | 0.3 | 0.29 | | |
| Endrin Aldehyde | 0.3 | 0.29 | | |
| Ethylbenzene | 11000 | 700 (MCL) | | |
| Fluoranthene | 140 | 130 | | |
| Fluorene | 5300 | 1108 | | |
| Fluoride | | 4000 (MCL) | | |
| Heptachlor | 0.18 | 0.18 | 0.000079 | 0.000079 |
| Heptachlor Epoxide | 0.0046 | 0.0046 | 0.000039 | 0.000039 |
| Hexachlorobenzene | 0.36 | 0.35 | 0.00028 | 0.00028 |
| Hexachlorobutadiene | 2900 | 68 | 18 | 0.44 |
| Hexachlorocyclohexane | | | 0.017 | 0.0091 |
| Hexachlorocyclopentadiene | 5500 | 50 (MCL) | | |
| Hexachloroethane | ~~46~~ 32 | ~~20~~ 14 | ~~3.3~~ 1.1 | ~~1.4~~ 0.5 |
| Ideno(1,2,3-cd)pyrene | | | 0.18 | 0.038 |
| Isophorone | 180000 | 6700 | 960 | 35 |
| Lead | | 15 (MCL) | | |
| alpha-BHC | | 0.2 (MCL) | 0.0048 | 0.0026 |
| beta-BHC | | 0.2 (MCL) | 0.017 | 0.0091 |
| gamma-BHC (Lindane) | 9.2 | 0.2 (MCL) | 0.23 | 0.12 |
| Methyl Mercury | 0.3mg/kg fish tissue | 0.3mg/kg fish tissue | | |
| Methoxychlor | | 40 (MCL) | | |

| | | | | |
|---|---|---|---|---|
| Methyl Bromide | 1500 | 47 | | |
| 3-Methyl-4-Chlorophenol | | | | |
| Nickel (soluble salts) | 1700 | 100 (MCL) | | |
| Nitrate | | 10000 (MCL) | | |
| Nitrobenzene | ~~690~~ 2800 | ~~17~~ 68 | | |
| N-Nitrosodimethylamine | | | 3 | 0.00069 |
| N-Nitrosodi-n-Propylamine | | | 0.51 | 0.005 |
| N-Nitrosodiphenylamine | | | 6 | 3.3 |
| Pentachlorophenol | ~~11000~~ 1800 | 1 (MCL) | ~~3~~ 0.9 | ~~0.27~~ 0.08 |
| Phenol | 860000 | 10000 | | |
| Polychlorinated Biphenyls PCBs: | | 0.5 (MCL) | 0.000064 | 0.000064 |
| Pyrene | 4000 | 830 | | |
| Selenium | 4200 | 50 (MCL) | | |
| Silver | 40000 | 170 | | |
| 1,1,2,2-Tetrachloroethane | 16000 | 670 | 4 | 0.17 |
| Tetrachloroethylene | ~~1300~~ 780 | 5 (MCL) | ~~3.3~~ 62 | ~~0.69~~ 13 |
| Thallium | 18 | 2 (MCL) | | |
| Toluene | 30000 | 1000 (MCL) | | |
| Total Trihalomethanes (TTHM) | | 80 (MCL) | | 80 |
| Toxaphene | | 3 (MCL) | 0.00028 | 0.00028 |
| 1,2-Trans-Dichloroethylene | 51000 | 100 (MCL) | | |
| 1,2,4-Trichlorobenzene | 350 | 70 (MCL) | | |
| 1,1,1-Trichloroethane | 1400000 | 200 (MCL) | | |
| 1,1,2-Trichloroethane | 3600 | 5 (MCL) | 16 | 0.59 |
| Trichloroethylene | 190 | 5 (MCL) | ~~30~~ 8.2 | ~~2.5~~ 0.7 |
| 2,4,6-Trichlorophenol | | | 2.4 | 1.4 |
| 2,4,5 Trichlorophenoxypropionic acid (2,4,5-TP- Silvex) | | 50 (MCL) | | |
| Vinyl Chloride | 10000 | 2 (MCL) | 2.4 | 0.025 |
| Zinc | 26000 | 7400 | | |

The columns labeled "Fish and Water Ingestion" shall apply only to waters of the State designated Public Water Supply sources in these standards.

The column labeled "Fish Ingestion Only" shall apply to all waters of the State not designated Public Water Supply sources in this document.

Values shown with "(MCL)" under header "Fish and Water Ingestion" are Primary Maximum Contaminant Levels (MCLs) as given in the State of Delaware Regulations Governing Public Drinking Water Systems that became effective September 10, 2001

[[1] Criteria is for the "total toxic equivalence (TEQ) to 2, 3, 7, 8 - TCDD". The toxic equivalence for a sample is the sum of the concentration for each congener multiplied by its associated Toxicity Equivalence Factor (TEF) listed in table below.

TEQ = ((Concentration of Congener in sample) x (TEF))

where the TEF is unitless and the concentration is in ug/l.

| Congener | TEF value | Congener | TEF value |
|---|---|---|---|
| *Dibenzo-p-dioxins* | | *Non-ortho PCBs* | |
| 2,3,7,8-TCDD | 1 | PCB 77 | 0.0001 |
| 1,2,3,7,8-PnCDD | 1 | PCB 81 | 0.0003 |
| 1,2,3,4,7,8-HxCDD | 0.1 | PCB 126 | 0.1 |
| 1,2,3,6,7,8-HxCDD | 0.1 | PCB 169 | 0.03 |
| 1,2,3,7,8,9-HxCDD | 0.1 | | |
| 1,2,3,4,6,7,8-HpCDD | 0.01 | *Mono-ortho PCBs* | |
| OCDD | 0.0003 | PCB 105 | 0.00003 |
| | | PCB 114 | 0.00003 |
| *Dibenzofurans* | | PCB 118 | 0.00003 |
| 2,3,7,8-TCDF | 0.1 | PCB 123 | 0.00003 |
| 1,2,3,7,8-PnCDF | 0.03 | PCB 156 | 0.00003 |
| 2,3,4,7,8-PnCDF | 0.3 | PCB 157 | 0.00003 |
| 1,2,3,4,7,8-HxCDF | 0.1 | PCB 167 | 0.00003 |
| 1,2,3,6,7,8-HxCDF | 0.1 | PCB 189 | 0.00003 |
| 1,2,3,7,8,9-HxCDF | 0.1 | | |
| 2,3,4,6,7,8-HxCDF | 0.1 | | |
| 1,2,3,4,6,7,8-HpCDF | 0.01 | | |
| 1,2,3,4,7,8,9-HpCDF | 0.01 | | |
| OCDF | 0.0003 | | |

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**5.0 Antidegradation and ERES Waters Policies**

5.1‘ Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. Degradation of water quality in such a manner that results in reduced number, quality, or river or stream mileage of existing uses shall be prohibited. Degradation shall be defined for the purposes of this section as a statistically significant reduction, accounting for natural variations, in biological, chemical, or habitat quality as measured or predicted using appropriate assessment protocols.

5.2 Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected. In the case of waters of exceptional recreational or ecological significance, existing quality shall be maintained or enhanced. Limited degradation may be allowed if the Department finds, after full satisfaction of public participation provisions of 7 **Del.C.** Sections 6004 and 6006 and the intergovernmental coordination provisions of the State's continuing planning process as required in 40 CFR Part 130, that allowing lower water quality is necessary to accommodate important social or economic development, or would result in a substantial net environmental or public health benefit, in the area in which the waters are located. In allowing such degradation or lower water quality, the Department shall assure maintenance of water quality adequate for full protection of existing uses. Further, the Department shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

5.3 Where high quality waters constitute an outstanding National resource, such as waters of National parks and wildlife refuges, existing quality shall be maintained and protected.

5.4 In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with Section 316 of the Water Quality Act of 1987.

5.5 The hearing requirement imposed by Subsections 5.2 above shall not be construed to impose a requirement for an additional public hearing where such a hearing is otherwise held pursuant to law, provided the requirements of this section are hereby met.

5.6 Criteria for Waters of Exceptional Recreational or Ecological Significance (ERES Waters)

5.6.1 General Policy

5.6.1.1 Designated ERES waters shall be accorded a level of protection and monitoring in excess of that provided most other waters of the State. These waters are recognized as special natural assets of the State, and must be protected and enhanced for the benefit of present and future generations of Delawareans.

5.6.1.2 ERES waters shall be restored, to the maximum extent practicable, to their natural condition. To this end, the Department shall, through adoption of a pollution control strategy for each ERES stream basin, take appropriate action to cause the systematic control, reduction, or removal of existing pollution sources, and the diversion of new pollution sources, away from ERES waters.

5.6.1.3 Discharges to ERES waters shall be avoided to the maximum extent practicable. In order to be permitted, a discharge must be the least environmentally damaging practicable alternative.

5.6.1.4 Prior to any public notice for a discharge permit required pursuant to 7 **Del.C.** Ch. 60, the Department shall make a determination that potential impacts have been avoided to the maximum extent practicable, and that remaining unavoidable impacts will be minimized to the extent appropriate and practicable. Findings shall be based upon appropriate factual determinations, evaluations, and tests with special emphasis on the persistence and permanence of the impacts. Under this provision impacts considered individually or collectively include:

5.6.1.4.1 Impacts of pollutants on human health and welfare;

5.6.1.4.2 Impacts of pollutants on life stages of aquatic life and other wildlife dependent on aquatic ecosystems including, but not limited to, the transfer, concentration, and spread of pollutants or their by-products through biological, physical, and chemical processes;

5.6.1.4.3 Impacts of pollutants on aquatic ecosystem diversity, productivity, and stability. Such impacts may include, but are not limited to, loss of fish and wildlife habitat or loss of the capacity of a wetland to assimilate nutrients, purify water, or reduce wave energy; or

5.6.1.4.4 Impacts on recreational, aesthetic, and economic values.

5.6.1.5 Any applicant for a discharge permit required pursuant to 7 **Del.C.** Ch. 60 shall provide to the Department, as part of a complete application, a resource assessment tailored to the site performed by qualified professionals. Such assessments shall fully consider ecological functions and values in light of the policies set forth in these standards. Consideration shall be given to:

5.6.1.5.1 Potential impacts on physical and chemical characteristics of the aquatic ecosystems which shall include, but not be limited to, substrates, substrate particulates/turbidity, water, current patterns, water circulation, normal water fluctuations, and salinity gradients;

5.6.1.5.2 Potential impacts on biological characteristics of the aquatic ecosystem which shall include, but not be limited to, fish, crustaceans, mollusks and other organisms in the food web, other wildlife, and threatened or endangered species; and

5.6.1.5.3 Potential effects on human use characteristics which shall include, but not be limited to, water supplies, recreational and commercial fisheries, water related recreation, aesthetics, parks, research sites, wildlife areas or public access areas.

5.6.2 General Provisions

5.6.2.1 In cases where natural conditions prevent attainment of applicable fresh or marine dissolved oxygen criteria, reduction in dissolved oxygen levels as a result of human activities shall be prohibited.

5.6.2.2 All point, and human induced nonpoint sources subject to control through use of best management practices or otherwise, shall be required to remove nutrients to the extent necessary to prevent excessive growth of photosynthetic organisms.

5.6.2.3 All point, and human induced nonpoint sources subject to control through use of best management practices or otherwise, shall be required to remove particulate matter to the extent necessary to minimize turbidity.

5.6.2.4 ERES waters shall not exhibit toxicity within aquatic habitats commonly used by native or migratory aquatic, terrestrial, and avian species. Such habitats include, but may not be limited to, spawning sites, nursery areas, forage areas, and migratory pathways.

5.6.2.5 ERES standards shall not apply in excavated waters. All other appropriate criteria shall remain in force for these waters.

5.6.2.6 The ERES criteria set forth in Section 5.6 supplement all other applicable requirements of these standards for ERES waters. Nothing in Section 5.6 relieves or reduces the obligation of any person to comply with other requirements of these Standards, federal or state laws and regulations.

5.6.3 Pollution Prevention

5.6.3.1 Existing Sources: For the purposes of this Section, an existing source shall be defined as a discharge for which a permit has been issued by the Department pursuant to 7 **Del.C.** Ch. 60 prior to January 1, 1991. In the case of a water body designated as ERES waters pursuant to Section 3 of the Standards, the Department shall not issue or reissue a permit for an existing source unless the applicant demonstrates a utilization of all economically feasible and reasonably available waste minimization practices and technologies, and the lack of feasible alternative production processes and disposal options.

5.6.3.2 The provisions of Subsections 5.6.1.4, 5.6.1.5, and 5.6.3.1 shall apply to existing sources on January 1, 1996, or upon adoption of a Pollution Control Strategy as provided in Section 5.6.3.5, whichever occurs first. In either event, the provisions of Section 5.6, including all requirements of the Pollution Control Strategy shall apply to existing sources.

5.6.3.3 Increased or New Sources: For the purposes of Section 5.6, new sources are those discharges for which a permit has not been issued pursuant to 7 **Del.C.** Ch. 60 prior to January 1, 1991, and increased sources are those discharges for which there is an increase in the mass loading of any pollutant of concern from any existing source. For the purposes of Section 5.6, pollutants of concern are the following: oxygen demanding substances (as may be measured by BOD and COD), nitrogen, phosphorous, bacteria, heat, and total suspended solids. In the case of any waterbody designated as ERES waters pursuant to Section 3 of the Standards, the Department shall not issue or reissue a permit pursuant to 7 **Del.C.** Ch. 60 that allows an increase in or new source of pollutant loadings of pollutants of concern unless the applicant demonstrates:

5.6.3.3.1 A need to discharge based upon a showing of the full utilization of measures, processes, methods, systems or techniques to eliminate the discharge altogether or minimize waste loadings through process changes, substitution of materials, enclosure of systems or other modifications. This can be demonstrated through the full utilization of available waste minimization practices and technologies and the lack of feasible alternative production processes and disposal options; and

5.6.3.3.2 That a proposed new discharge or any increase in loading of pollutants of concern of an existing discharge is consistent with the Pollution Control Strategy for the basin. Prior to adoption of a Pollution Control Strategy for a stream basin no increase in loadings of pollutants of concern shall be allowed to the stream basin from a surface water discharger unless the Secretary determines that:

5.6.3.3.2.1 Such discharger offsets the increased surface water discharge of pollutants of concern within the stream basin to the maximum extent practicable in an acceptable manner;

5.6.3.3.2.2 The increased loadings of pollutants of concern are necessary to prevent a substantial adverse economic or social impact at the community or regional level, and

5.6.3.2.2.3 Water quality will be maintained to fully protect existing uses.

5.6.3.4 Pollution Control Strategy

5.6.3.4.1 For each stream basin designated as ERES waters pursuant to Section 3 of these standards, the Department shall develop a pollution control strategy. The strategy shall provide for the implementation of best management practices established pursuant to Subsection 5.6.3.5 of this section and shall include such additional requirements, measures, and practices as are necessary to:

5.6.3.4.1.1 Prevent the violation of water quality standards;

5.6.3.4.1.2 Protect all resources in the stream basin in a manner that allows for natural conditions to be maintained or restored; and

5.6.3.4.1.3 Assure the protection and propagation of a balanced, indigenous population of fish, shellfish, aquatic vegetation, and wildlife, and provide for recreational activities in and on the water.

5.6.3.4.2 The strategy pursuant to this subsection shall, at a minimum:

5.6.3.4.2.1 Provide an assessment of the nature, degree, and extent of pollution to waters within such stream basin, in terms of point source and non-point source contribution;

5.6.3.4.2.2 Identify the aspects of the stream basin which are important, unique, or sensitive from a recreational or ecological perspective;

5.6.3.4.2.3 Establish such additional indicators and criteria that satisfy the general policy and provisions established for such stream basins;

5.6.3.4.2.4 Identify the means by which ERES standards will be achieved;

5.6.3.4.2.5 Delineate, where appropriate, the specific point source effluent limits, best management practices, and other controls that will be used to achieve water quality standards; and

5.6.3.4.2.6 Indicate changes to be made to state plans for control of water pollution or resource management to assure implementation of the strategy.

5.6.3.4.3 The Department shall assure the opportunity for public participation in the development of the strategy required pursuant to this subsection and shall provide for public review and comment on the strategy in accordance with 7 **Del.C.** §6010.

5.6.3.4.4 The Department may, to the extent it deems appropriate, provide technical assistance to local governments in developing and implementing the strategy required pursuant to this subsection.

5.6.3.4.5 The Department shall, to the extent it deems appropriate, pursue and coordinate implementation of any strategy developed pursuant to this subsection through priority application of its resources to ERES waters through its regulatory and non-regulatory programs.

5.6.3.4.6 The Department may, in accordance with 7 **Del.C.** §6010, adopt and require the use of specific combinations of methods, practices, and technologies which it deems to be most effective for controlling, reducing, or removing waste loadings to ERES waters. Such requirements shall be based upon the application of good engineering and environmental science practices and principles, achieve a high degree of reliability, and be appropriate for the categories of activity.

5.6.3.5 Best Management Practices

The Department may adopt, pursuant to 7 **Del.C.** §6010, best management practices for selected sources of pollution to ERES waters. Best management practices identified by the Department pursuant to this subsection shall provide a standard for the control of the addition of pollutants which reflects the greatest degree of pollutant reduction achievable including, where practicable, a standard requiring no discharge of pollutants.

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**6.0 Regulatory Mixing Zones**

The following requirements shall apply to regulatory mixing zones:

6.1 Applicability: In instances where the Department determines, based upon engineering calculations or field studies, that complete mix (as defined herein) of effluent with its receiving water is not expected to occur, the Department may allocate a designated portion of the receiving water to provide for mixing of the effluent and the receiving water. This area shall be defined as a regulatory mixing zone and shall be determined on a case-by-case basis taking into account critical flows, outfall configuration and receiving stream characteristics. A mixing zone will not be allocated in instances where the Department determines that complete mix of effluent and receiving water occurs at the point of discharge, in which case, the critical flows as provided in Section 7 shall be applied in determining if the applicable criteria are met.

6.2 Location: Regulatory mixing zones shall not impinge upon areas of special importance, including but not limited to drinking water supply intakes, nursery areas for aquatic life or waterfowl, approved or conditional shellfish areas, or heavily utilized primary contact recreation areas. Zones shall not be located in such a manner as to interfere with passage of fishes or other organisms. Shore-hugging plumes should be avoided to the maximum extent practicable. In areas where multiple discharges are located in proximity, overlapping discharge plumes may occur. In such instances, the size limitations derived under Section 6.4 may be reduced to preclude acute toxicity in the overlap areas, or to ensure an adequate zone of passage for fish.

6.3 Outfall Design: Outfalls shall be designed to provide maximum protection for humans, aquatic life, and wildlife. Surface discharges to shallow near-shore areas shall be discouraged in preference to submerged outfalls located in deep offshore areas or other alternative discharge configurations which achieve Water Quality Standards.

6.4 Size: Size of the zone shall be no larger than is necessary to provide for mixing of effluent and receiving water. The following are the maximum size limitations that shall apply unless the discharger can demonstrate to the satisfaction of the Department that a larger mixing zone would not have an adverse impact in the receiving water:

6.4.1 Mixing zones for non-thermal pollutants shall be designed as follows:

6.4.1.1 Rivers: During critical stream flow, as detailed in Section 8.0 of these standards, the maximum distance to the edge of the mixing zone shall be described by:

$$x_m \leq (u \bullet W^2) / (6H\sqrt{g\,H\,S})$$

where $x_m$ = maximum mixing zone length,

u = flow velocity for critical flow as detailed in Subsection 7.2.3 or Section 7.3,

W = width of river,

H = depth of river,

g = acceleration due to gravity, and

S = slope of river surface.

6.4.1.2 Lakes: Because of the shallow depth and small size of Delaware lakes, regulatory mixing zones shall be prohibited in these waters.

6.4.1.3 Tidal waters: For mean low water slack tide conditions, the maximum horizontal distance from the edge of the outfall structure to the edge of the mixing zone shall be no greater than twenty-five percent (25%) of the width of the tidal water at the point of discharge.

6.4.2 Mixing zones for thermal (temperature) pollutants shall be defined as those waters between the point of discharge and the point at which the receiving water temperature criteria are met as defined in Section 4.0, subject to criteria 6.4.2.1 through 6.4.2.5 below. For non-tidal freshwater, mixing zones shall be designed using the critical stream flow specified in Section 7.1 or 7.3.

6.4.2.1 The greatest offshore extension of the mixing zone shall not exceed 50 percent of the width of the waterbody at the point of discharge.

6.4.2.2 Thermal mixing zone cross-sectional area as measured in a vertical plane perpendicular to the receiving water flow shall not occupy more than 25 percent (25%) of the cross-sectional area of the receiving water as measured from the point of discharge to the opposite shore.

6.4.2.3 In areas where multiple discharges are located in proximity, overlapping discharges may occur. In such instances, the above size limitations shall apply to the cumulative influence of the multiple discharges.

6.4.2.4 Because of the shallow depth and small size of Delaware lakes, thermal mixing zones shall be prohibited in those waters.

6.4.2.5 As an alternative to 6.4.2.1 through 6.4.2.4 above, the size of the thermal mixing zone may be determined on a site-specific basis. This determination must be based upon a sound rationale and be supported by substantial biological, chemical, physical, and engineering evidence and analysis. Any such determination must show to the Department's satisfaction that no adverse changes in the protection and propagation of balanced indigenous populations of fish, aquatic life, and wildlife, may reasonably be expected to occur. A satisfactory showing made in conformance with Section 316(a) of the Water Quality Act of 1987 shall be deemed as compliance with the requirements of this paragraph.

6.5 In-Zone and Boundary of Zone Water Quality Requirements:

6.5.1 Regulatory mixing zones shall not be used for, or considered as, a substitute for minimum treatment technology required by the Clean Water Act or other applicable State and Federal laws or regulations.

6.5.2 Regulatory mixing zones shall be free of the following:

6.5.2.1 Materials which result in the accumulation of toxic substances in sediment, aquatic life, or food chains at levels that may be harmful to the health of humans or aquatic life;

6.5.2.2 Materials in concentrations that may settle to form deposits which smother benthic organisms, may exert significant dissolved oxygen demand, or may create a nuisance condition;

6.5.2.3 Floating debris, oil, scum, foam, and other matter in concentrations that may cause a nuisance condition;

6.5.2.4 Substances in concentrations that produce color, odor, taste, or turbidity that may lead to significant disruption of public water supply treatment systems, or may cause a nuisance condition; or

6.5.2.5 Substances in concentrations that may result in a dominance of nuisance species, or may affect species diversity.

6.5.3 No acute aquatic life criterion, as detailed in Subsection 4.6.3 of this document, may be exceeded at any point greater than one-tenth of the distance from the edge of the outfall structure to the boundary of the

regulatory mixing zone as defined above.Substances in concentrations that may result in a dominance of nuisance species, or may affect species diversity.

6.5.4 No acute aquatic life criterion, as detailed in Subsection 4.6.3 of this document, may be exceeded at any point greater than fifty (50) times the discharge length scale in any horizontal direction from the edge of the outfall structure.

6.5.5 No acute aquatic life criterion, as detailed in Subsection 4.6.3 of this document, may be exceeded at any point greater than five (5) times the average water depth in the regulatory mixing zone in any horizontal direction from the edge of the outfall structure.

6.5.6 No chronic aquatic life criterion, as detailed in Subsection 4.6.3 of this document, may be exceeded beyond the boundary of the regulatory mixing zone as defined above.

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## 7.0 Critical Flows

7.1 For all waters of the State, all water quality standards and criteria, except those for toxic substances, shall not apply at those times when the freshwater flow or net advective flow falls below that value that is equal to the flow of 7-day duration with recurrence interval of 10 years (generally known as the 7Q10 or the Q7-10). However, at all times all waters shall be free of materials and substances as listed in Section 6.5.2.

7.2 For all waters of the state, water quality criteria for toxic substances as specified in Section 4.6.3 shall not apply at those times when the freshwater or net advective flow falls below the following values:

7.2.1 The harmonic mean flow, for human carcinogens;

7.2.2 The flow of 30-day duration with recurrence interval of 5 years (generally known as the 30Q5 or Q30-5), for human systemic toxicants and for ammonia fresh water aquatic life chronic toxicity criteria;

7.2.3 The flow of 7-day duration with recurrence interval of 10 years (generally known as the 7Q10 or the Q7-10), for compounds having a chronic toxicity criterion; and

7.2.4 The flow of 1-day duration with recurrence interval of 10 years (generally known as the 1Q10 or the Q1-10), for compounds having an acute toxicity criterion.

7.3 These critical flows shall also be used as design flows for developing water quality-based discharge limitations for the referenced groups of parameters. The Department shall consider scientifically reasonable requests for seasonally adjusted flows or the use of dynamic modeling techniques for this purpose on a case-by-case basis.

7.4 Nothing in Section 7 shall be construed as allowing any reduction in efficiency of, or suspension of, required pollution control practices, whether applied to point or nonpoint sources, during periods when flows are less than those specified for suspension of standards applicability in Subsections 7.1-7.3.

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## 8.0 Criteria for Low Flow Waters

8.1 A low flow water is one in which the 7Q10 freshwater inflow is less than 0.1 cfs. The following criteria shall apply to discharges into low flow waters:

8.1.1 Where information is available for the receiving water which indicates that, because of low flow, it would not support designated uses, then numeric criteria shall not apply. The numeric criteria shall then apply at the closest downstream point where uses could reasonably be expected to occur.

8.1.2 The discharge shall not add:

8.1.2.1 Materials which result in the accumulation of toxic substances in sediment, aquatic life or food chains at levels that may be harmful to the health of humans or aquatic life;

8.1.2.2 Materials in concentrations that may settle to form deposits which smother benthic organisms, may exert significant dissolved oxygen demand, or may create a nuisance condition;

8.1.2.3 Floating debris, oil, scum, foam, and other matter in concentrations that may cause a nuisance condition;

8.1.2.4 Substances in concentrations that produce color, odor, taste or turbidity that may lead to significant disruption of a public water supply treatment systems, or may cause a nuisance condition; or

8.1.2.5 Substances in concentrations that may result in a dominance of nuisance species, or may affect species diversity.

8.2 The applicant for discharge shall bear the burden of showing, to the satisfaction of the Department, that the provisions of 8.1.1 and 8.1.2 above are met.

8.3 Any application for new or increased discharge to a low flow water must include a thorough evaluation of alternate discharge configurations, including but not limited to water conservation, relocating the outfall to a

more suitable location, conveying the wastewater to other available treatment facilities, or utilizing land treatment. Alternatives which do not include discharge must be used wherever technologically feasible and cost-effective (notwithstanding other requirements of these or other applicable regulations).

## 9.0 Exceptions, Modifications and Conditions

9.1 Exceptions and Modifications

9.1.1 Request for Removal of Designated Uses: The Department shall consider scientifically reasonable requests for the removal of a designated use which is not an existing use, or the establishment of sub-categories of a use for a water body or segment of specific waters of the State based upon the demonstration by means of a Use Attainability Analysis that attainment of the designated use is not feasible because:

9.1.1.1 Naturally occurring pollutant concentrations prevent the attainment of the use; or;

9.1.1.2 Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or

9.1.1.3 Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

9.1.1.4 Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

9.1.1.5 Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

9.1.1.6 Controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act would result in substantial and widespread economic and social impact.

A request for removal of designated uses shall be deemed a scientifically reasonable request if it is demonstrated that the Use Attainability Analysis prepared and submitted by the requestor is based upon sound scientific rationale and is supported by substantial scientific and technical evidence and analysis as to the existence of one or more of the factors listed above. If the Department finds any request for removal to be frivolous or to be flawed as to the methods used to obtain evidence or perform analysis to such an extent that the validity of the conclusions would be challenged by most persons trained and competent in the use and interpretation of the technical or scientific methods employed, it may dismiss such request for removal without further action. If the Department determines that a scientifically reasonable request has been made, it shall make a preliminary determination as to the proposed change and hold a public hearing in accordance with 7 **Del.C.** §6006. The removal or establishment of sub-categories of a designated use completed under this Section are deemed to be duly adopted components of the State of Delaware Surface Water Quality Standards.

The Department will not consider requests for the removal of a designated use, for a water body or segment of specific waters of the State if:

9.1.1.7 They are existing uses unless a use requiring more stringent criteria is added; or

9.1.1.8 The designated use will be attained by implementing effluent limits required under sections 301(b) and 306 of the Clean Water Act and by implementing cost-effective and reasonable best management practices for nonpoint source control.

9.1.2 Request for Modification of Water Quality Criteria: The Department shall consider scientifically reasonable requests for modification of water quality criteria contained herein for portions of specific waters of the State. A request for modification shall be deemed to be a scientifically reasonable request if it is based upon a sound rationale, and supported by substantial scientific evidence and analysis. This evidence and analysis must demonstrate the existence of site-specific differences in the chemical, physical, or biological characteristics of the surface water, and must propose alternate site-specific water quality criteria. Scientific studies for the development of these alternate criteria shall be designed and conducted in accordance with the guidelines set forth in the Water Quality Standards Handbook Second Edition, EPA 823/B-94-005 or other scientifically defensible methodologies approved by the Department. If the Department finds any request for modification to be frivolous, to be flawed as to the methods used to obtain evidence and to perform analysis to such an extent that the validity of the conclusions would be challenged by most persons trained and competent in the use and interpretation of the technical and

scientific methods employed, or to contain reasonable evidence that a reduction in the number, quality, or river or stream mileage of designated uses would occur, it may dismiss such request for modification without further action. If the Department determines that a scientifically reasonable request has been made, the Department shall make a preliminary determination as to the proposed change and shall hold a public hearing in accordance with 7 **Del.C.** §6006. If the Department determines that a scientifically reasonable request has been made pursuant to this Section and such request could result in a change in discharge limits, then the public hearings for the discharge limitation change and the criteria modification shall be held concurrently. In such case, the Department shall provide separate public notices for the discharge limitation change and the criteria modification. Criteria modification completed under this Section are deemed to be duly adopted components of the State of Delaware Surface Water Quality Standards.

9.1.2.1 In the absence of pollutants corroded and eroded from the facility's water distribution piping and appurtenances, there would be no violation of the surface water quality criteria in the receiving water; and

9.1.2.2 The normal corrosion and erosion associated with the intake water used by the facility is sufficient to be the sole cause of the violation. For purposes of this determination, intake water characteristics shall be used in assessing normal corrosion and erosion; and

9.1.2.3 No other activity, condition or method of operation, or materials used or produced at the facility, which results in the addition to erosion and corrosion based pollutants into the facility's discharge, significantly contributes to the violations of surface water quality criteria in the receiving waters. Such activities, conditions or methods of operation, or materials used or produced at the facility include entrainment of pollutants previously discharged or disposed by the facility; and

9.1.2.4 No practicable alternative water supply or treatment methodology or system which would yield statistically significant lower corrosivity or erosiveness is available to the facility; and

9.1.2.5 The discharger demonstrates that controls more stringent than technology-based limits and Section 306 of the Clean Water Act that would result in substantial and widespread economic and social impact. The analysis of economic impacts must demonstrate that:

9.1.2.5.1 The discharger would face substantial financial impacts due to the costs of the necessary pollution controls or water treatment (substantial impacts of which would interfere with development), and

9.1.2.5.2 The affected community will bear significant adverse impacts if the entity is required to meet existing or proposed water quality standards (widespread impacts of important development).

9.2 Conditions

9.2.1 Any person who shall apply for a permit to discharge to the waters of the State shall have the opportunity to submit an analysis to the Department at the time of application to demonstrate that said discharge will not cause, have the reasonable potential to cause, or contribute to an excursion of the receiving stream's water quality standards. The Department shall consider any analysis submitted by the applicant and also conduct its own analysis in making a determination whether the discharge causes, has the reasonable potential to cause, or contributes to an excursion of standards. Analyses performed under Subsection 9.2.1 shall be conducted in concert with the requirements of Section 3, as applicable. A public hearing, pursuant to 7 **Del.C.** §6004 and 6006, may be held to gather public comment on any analysis submitted by an applicant in conjunction with Subsection 9.2.1.

9.2.2 Consistency with Other State and Federal Requirements: Nothing in Section 9 relieves or reduces the obligation of any person to comply with other applicable provisions of these Standards, federal or state laws and regulations.

**10.0 Separability**

Should any section, paragraph, or other part of this document be declared invalid for any reason, the remainder shall not be affected.

**3 DE Reg. 311 (8/1/99)**
**8 DE Reg. 154 (7/1/04)**
**18 DE Reg. 312 (10/01/14) (Final)**