

Table 1. RIDEM Ambient Water Quality Criteria and Guidelines

CHEMICAL NAME	CAS Number	AQUATIC LIFE CRITERIA (µg/l)				CARCINOGEN ?	HUMAN HEALTH CRITERIA (ug/l) ²	
		FRESHWATER		SALTWATER			For Consumption of:	
		ACUTE	CHRONIC	ACUTE	CHRONIC		Water and Aquatic Organisms	Aquatic Organisms Only
2,4-DICHLORO-6-METHYLPHENOL		22*	0.48*	-	-		-	-
1,1-DICHLOROPROPANE		1150*	26*	-	-		-	-
1,3-DICHLOROPROPANE	142289	303*	6.7*	-	-		-	-
2,3-DINITROTOLUENE		17*	0.37*	-	-		-	-
2,4-DINITRO-6-METHYL PHENOL		12	0.26	-	-		-	-
IRON	7439896		1000				300	
PENTACHLOROENZENE	608935	13*	0.28*	-	-		-	-
PENTACHLOROETHANE		362*	8.0*	-	-		-	-
1,2,3,5-TETRACHLOROENZENE		321*	7.1*	-	-		-	-
1,1,1,2-TETRACHLOROETHANE	630206	980*	22*	-	-		-	-
2,3,4,6-TETRACHLOROPHENOL	58902	7*	0.16*	-	-		-	-
2,3,5,6-TETRACHLOROPHENOL		8.5*	0.19*	-	-		-	-
2,4,5-TRICHLOROPHENOL	95954	23*	0.51*	-	-		-	-
2,4,6-TRINITROPHENOL	88062	4235	94	-	-		-	-
XYLENE	1330207	133 *	3.0 *	-	-		-	-

Table 1 RIDEM Ambient Water Quality Criteria and Guidelines

KEY:

* = RIDEM minimum database guidelines.

** = Only data generated in toxicity and bioconcentration tests on TBTCI (tributyltin chloride; CAS 1461-22-9), TBTF (tributyltin fluoride; CAS 1983-10-4), TBTO [bis(tributyltin) oxide; CAS 56-35-9], commonly called “tributyltin oxide” and TBTS[bis(tributyltin) sulfide; CAS 4808-30-4], commonly called “tributyltin sulfide” were used in the derivation of the water quality criteria concentrations for aquatic life presented herein. All concentrations from such tests are expressed as TBT, not as tin and not as the chemical tested.

■ = Freshwater criteria for aluminum are for waters in which the pH is between 6.5 and 9

= See Table 3 for ammonia criteria

@ = see Table 2 for criteria equations

- = No criteria recommendation.

\$ = The aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development. The acute values shown are final acute values which, by the 1980 Guidelines, are instantaneous values as contrasted with a Criteria Maximum Concentration (CMC) which is a one-hour average.

¹ = carcinogens calculated at 10⁻⁵ risk

² = criteria are in µg/l unless otherwise noted
 µg/l = micrograms/liter
 ng/l = nanograms/liter
 mg/l = milligrams/liter

³ = Polychlorinated Biphenyl criteria apply to total PCBs (e.g. the sum of all cogener or all isomer or homolog or Aroclor analyses.)

⁴ = Polycyclic Aromatic Hydrocarbons criteria apply to each of the following:

<u>PAH</u>	<u>CAS Number</u>
indeno(1,2,3-cd)pyrene	193395
dibenzo(ah)anthracene	53703
benzo(a)anthracene	56553
benzo(a)pyrene	50328
benzo(b)fluoranthene	205992
benzo(k)fluoranthene	207089
chrysene	218019

(Key is continued on next page)

Table 1 RIDEM Ambient Water Quality Criteria and Guidelines

Key (continued):

⁵ = Freshwater values in Table 1 for the following parameters are presented as dissolved criteria using the EPA recommended conversion factors (CF), as listed below:

Metal	Acute CF	Chronic CF
Arsenic	1.000	1.000
Cadmium	$1.136672 - [(\ln H) \times 0.041838]$	$1.101672 - [(\ln H) \times 0.041838]$
Chromium III	0.316	0.86
Chromium VI	0.982	0.962
Copper	0.96	0.96
Lead	$1.46203 - [(\ln H) \times 0.145712]$	$1.46203 - [(\ln H) \times 0.145712]$
Mercury	0.85	0.85
Nickel	0.998	0.997
Silver	0.85	(no freshwater criteria)
Zinc	0.978	0.986

NOTE: (ln H) = natural log of Hardness, using any hardness as appropriate.

⁶ = Saltwater values in Table 1 for the following parameters are presented as dissolved criteria using the EPA recommended conversion factors, as listed below:

Metal	Conversion Factor
Arsenic	1.000
Cadmium	0.994
Chromium III	(no saltwater criteria)
Chromium VI	0.993
Copper	0.83
Lead	0.951
Mercury	0.85 (see Note below)
Nickel	0.990
Selenium	0.998
Silver	0.85
Zinc	0.946

NOTE: Conversion factors on this table were calculated for acute criteria only. Conversion factors for chronic criteria are not currently available. In the absence of chronic conversion factors saltwater acute conversion factors are used. Chronic criteria for mercury cannot be converted to dissolved because it is based on mercury residues rather than toxicity.

Table 2. Freshwater Criteria Equations and Base e Exponential Values

Parameter	ACUTE (µg/l) $CF \times e^{(m_a [\ln \text{Hardness}] + b_a)}$			CHRONIC (µg/l) $CF \times e^{(m_c [\ln \text{Hardness}] + b_c)}$		
	CF =	$m_a =$	$b_a =$	CF =	$m_c =$	$b_c =$
Cadmium	@	1.0166	-3.924	@	0.7409	- 4.719
Chromium III	0.316	0.8190	3.7256	0.86	0.819	0.6848
Copper	0.96	0.9422	-1.700	0.96	0.8545	-1.702
Lead	#	1.273	-1.46	#	1.273	-4.705
Nickel	0.998	0.846	2.255	0.997	0.846	0.0584
Silver	0.85	1.72	-6.52	-	-	-
Zinc	0.978	0.8473	0.884	0.986	0.8473	0.884
Pentachlorophenol*	-	1.005	-4.869	-	1.005	-5.134

- Hardness values are in mg/l as CaCO₃

- = no recommended value

* substitute pH for hardness in the equations for pentachlorophenol

CF = Conversion Factor to calculate dissolved metal from total metal concentrations

@ = Cadmium Conversion Factors:

$$\begin{aligned} \text{acute CF} &= 1.136672 - [(\ln H) \times 0.041838] \\ \text{chronic CF} &= 1.101672 - [(\ln H) \times 0.041838] \end{aligned}$$

[ln H] = natural log of hardness

= Lead Conversion Factors:

$$\text{acute and chronic CF} = 1.46203 - [(\ln H) \times 0.145712]$$

EXAMPLE:

If you wish to calculate the acute criteria for Copper at a hardness of 30 mg/l, the equation value for $m_a = 0.9422$, $b_a = -1.700$, and $CF = 0.96$ from Table 2.

The acute criteria equation for dissolved Copper is therefore:

$$0.96 \times e^{(0.9422[\ln 30] + (-1.700))} = 4.32$$

NOTE: When an ambient hardness of less than 25 mg/L is used to establish criteria for lead or cadmium, the hardness dependent Conversion Factor (CF) should not exceed one.

Result : The acute criteria for Dissolved Copper at a hardness of 30 mg/l is = 4.32 µg/l

Table 3 Ammonia Criteria

A. Freshwater

1. Acute Criteria as Total Ammonia Nitrogen (mg N/L)

pH	Acute Criterion with Salmonids present	Acute Criterion with Salmonids absent
6.5	32.6	48.8
6.6	31.3	46.8
6.7	29.8	44.6
6.8	28.1	42.0
6.9	26.2	39.1
7.0	24.1	36.1
7.1	22.0	32.8
7.2	19.7	29.5
7.3	17.5	26.2
7.4	15.4	23.0
7.5	13.3	19.9
7.6	11.4	17.0
7.7	9.65	14.4
7.8	8.11	12.1
7.9	6.77	10.1
8.0	5.62	8.40
8.1	4.64	6.95
8.2	3.83	5.72
8.3	3.15	4.71
8.4	2.59	3.88
8.5	2.14	3.20
8.6	1.77	2.65
8.7	1.47	2.20
8.8	1.23	1.84
8.9	1.04	1.56
9.0	0.885	1.32

Table 3. Ammonia Criteria

A. Freshwater

2. Chronic Criteria for Fish Early Life Stages Present, mg N/L

Temperature and pH-Dependent Values of the Chronic Criterion for Fish Early Life Stages Present										
pH	Temperature, C									
	0	14	16	18	20	22	24	26	28	30
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.897
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.879	0.773
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.973	0.855	0.752	0.661
8.3	1.52	1.52	1.39	1.22	1.07	0.941	0.827	0.727	0.639	0.562
8.4	1.29	1.29	1.17	1.03	0.906	0.796	0.700	0.615	0.541	0.475
8.5	1.09	1.09	0.990	0.870	0.765	0.672	0.591	0.520	0.457	0.401
8.6	0.920	0.920	0.836	0.735	0.646	0.568	0.499	0.439	0.386	0.339
8.7	0.778	0.778	0.707	0.622	0.547	0.480	0.422	0.371	0.326	0.287
8.8	0.661	0.661	0.601	0.528	0.464	0.408	0.359	0.315	0.277	0.244
8.9	0.565	0.565	0.513	0.451	0.397	0.349	0.306	0.269	0.237	0.208
9.0	0.486	0.486	0.442	0.389	0.342	0.300	0.264	0.232	0.204	0.179

Table 3. Ammonia Criteria

A. Freshwater (continued)

3. Chronic Criteria for Fish Early Life Stages Absent, mg N/L

Temperature and pH-Dependent Values of the CCC (Chronic Criterion) for Fish Early Life Stages Absent										
pH	Temperature, C									
	0-7	8	9	10	11	12	13	14	15*	16*
6.5	10.8	10.1	9.51	8.92	8.36	7.84	7.35	6.89	6.46	6.06
6.6	10.7	9.99	9.37	8.79	8.24	7.72	7.24	6.79	6.36	5.97
6.7	10.5	9.81	9.20	8.62	8.08	7.58	7.11	6.66	6.25	5.86
6.8	10.2	9.58	8.98	8.42	7.90	7.40	6.94	6.51	6.10	5.72
6.9	9.93	9.31	8.73	8.19	7.68	7.20	6.75	6.33	5.93	5.56
7.0	9.60	9.00	8.43	7.91	7.41	6.95	6.52	6.11	5.73	5.37
7.1	9.20	8.63	8.09	8.58	7.11	6.67	6.25	5.86	5.49	5.15
7.2	8.75	8.20	7.69	7.21	6.76	6.34	5.94	5.57	5.22	4.90
7.3	8.24	7.73	7.25	6.79	6.37	5.97	5.60	5.25	4.92	4.61
7.4	7.69	7.21	6.76	6.33	5.94	5.57	5.22	4.89	4.59	4.30
7.5	7.09	6.64	6.23	5.84	5.48	5.13	4.81	4.51	4.23	3.97
7.6	6.46	6.05	5.67	5.32	4.99	4.68	4.38	4.11	3.85	3.61
7.7	5.81	5.45	5.11	4.79	4.49	4.21	3.95	3.70	3.47	3.25
7.8	5.17	4.84	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89
7.9	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89	2.71	2.54
8.0	3.95	3.70	3.47	3.26	3.05	2.86	2.68	2.52	2.36	2.21
8.1	3.41	3.19	2.99	2.81	2.63	2.47	2.31	2.17	2.03	1.91
8.2	2.91	2.73	2.56	2.40	2.25	2.11	1.98	1.85	1.74	1.63
8.3	2.47	2.32	2.18	2.04	1.91	1.79	1.68	1.58	1.48	1.39
8.4	2.09	1.96	1.84	1.73	1.62	1.52	1.42	1.33	1.25	1.17
8.5	1.77	1.66	1.55	1.46	1.37	1.28	1.20	1.13	1.06	0.990
8.6	1.49	1.40	1.31	1.23	1.15	1.08	1.01	0.951	0.892	0.836
8.7	1.26	1.18	1.11	1.04	0.976	0.915	0.858	0.805	0.754	0.707
8.8	1.07	1.01	0.944	0.885	0.829	0.778	0.729	0.684	0.641	0.601
8.9	0.917	0.86	0.806	0.756	0.709	0.664	0.623	0.584	0.548	0.513
9.0	0.790	0.740	0.694	0.651	0.610	0.572	0.536	0.503	0.471	0.442

At 15 C and above, the criterion for fish ELS absent is the same as the criterion for fish ELS present.

NOTE:

1. Averaging Periods and Frequency of Exceedances

Chronic Criteria - The ambient concentration, averaged over a period of 30 days, shall not exceed the chronic criterion more than once every three years on average. The highest four-day average ambient concentration should not exceed a concentration 2.5 times greater than the chronic criterion.

Acute Criteria - The ambient concentrations, averaged over one hour shall not exceed the acute criterion more than once every three years on average.

Early Life Stage Absent (ELS-Absent) Provision

This provision allows for a relaxation of the chronic criteria when early life stages (ELS) of fish are not present, since, at low ambient water temperatures, adult and juvenile fish are less sensitive to ammonia toxicity than are early life stages of fish. In accordance with EPA's guidance, *1999 Update of Ambient Water Quality Criteria for Ammonia*, it is appropriate to relax the ammonia chronic criterion, as ambient water temperature decreases, in waterbodies where it is determined, to the Director's satisfaction, that early life stages are not present. The chronic criteria applicable when ELS are absent are found in Table 3.A.3. The Director has determined that the ELS-Absent Provision applies, but is not limited, to:

- ii. The entire Blackstone River during the period November 1 to April 30.
- iii. The main stem of the Pawtuxet River during the period November 1 to April 30.
- iv. The Woonasquacket River from Georgiaville Pond to the confluence with the Moshassuck River during the period November 1 to April 30.

Table 3 continued

B. **Saltwater:** criteria as total ammonia (mg/l)

1. Acute Water Quality Criteria for Saltwater Aquatic Life Based on Total Ammonia (mg/l).
(To convert these values to mg/liter N, multiply by 0.822).

Temperature (°C)								
	0	5	10	15	20	25	30	35
pH	Salinity = 10 g/kg							
7.0	270	191	131	92	62	44	29	21
7.2	175	121	83	58	40	27	19	13
7.4	110	77	52	35	25	17	12	8.3
7.6	69	48	33	23	16	11	7.7	5.6
7.8	44	31	21	15	10	7.1	5.0	3.5
8.0	27	19	13	9.4	6.4	4.6	3.1	2.3
8.2	18	12	8.5	5.8	4.2	2.9	2.1	1.5
8.4	11	7.9	5.4	3.7	2.7	1.9	1.4	1.0
8.6	7.3	5.0	3.5	2.5	1.8	1.3	0.98	0.75
8.8	4.6	3.3	2.3	1.7	1.2	0.92	0.71	0.56
9.0	2.9	2.1	1.5	1.1	0.85	0.67	0.52	0.44
	Salinity = 20 g/kg							
7.0	291	200	137	96	64	44	31	21
7.2	183	125	87	60	42	29	20	14
7.4	116	79	54	37	27	18	12	8.7
7.6	73	50	35	23	17	11	7.9	5.6
7.8	46	31	23	15	11	7.5	5.2	3.5
8.0	29	20	14	9.8	6.7	4.8	3.3	2.3
8.2	19	13	8.9	6.2	4.4	3.1	2.1	1.6
8.4	12	8.1	5.6	4.0	2.9	2.0	1.5	1.1
8.6	7.5	5.2	3.7	2.7	1.9	1.4	1.0	0.77
8.8	4.8	3.3	2.5	1.7	1.3	0.94	0.73	0.56
9.0	3.1	2.3	1.6	1.2	0.87	0.69	0.54	0.44
	Salinity = 30 g/kg							
7.0	312	208	148	102	71	48	33	23
7.2	196	135	94	64	44	31	21	15
7.4	125	85	58	40	27	19	13	9.4
7.6	79	54	37	25	21	12	8.5	6.0
7.8	50	33	23	16	11	7.9	5.4	3.7
8.0	31	21	15	10	7.3	5.0	3.5	2.5
8.2	20	14	9.6	6.7	4.6	3.3	2.3	1.7
8.4	12.7	8.7	6.0	4.2	2.9	2.1	1.6	1.1
8.6	8.1	5.6	4.0	2.7	2.0	1.4	1.1	0.81
8.8	5.2	3.5	2.5	1.8	1.3	1.0	0.75	0.58
9.0	3.3	2.3	1.7	1.2	0.94	0.71	0.56	0.46

Table 3 continued

B. Saltwater:

2. Chronic Water Quality Criteria for Saltwater Aquatic Life Based on Total Ammonia (mg/l).
(To convert these values to mg/liter N, multiply by 0.822).

Temperature (°C)								
	0	5	10	15	20	25	30	35
pH	Salinity = 10 g/kg							
7.0	41	29	20	14	9.4	6.6	4.4	3.1
7.2	26	18	12	8.7	5.9	4.1	2.8	2.0
7.4	17	12	7.8	5.3	3.7	2.6	1.8	1.2
7.6	10	7.2	5.0	3.4	2.4	1.7	1.2	0.84
7.8	6.6	4.7	3.1	2.2	1.5	1.1	0.75	0.53
8.0	4.1	2.9	2.0	1.40	0.97	0.69	0.47	0.34
8.2	2.7	1.8	1.3	0.87	0.62	0.44	0.31	0.23
8.4	1.7	1.2	0.81	0.56	0.41	0.29	0.21	0.16
8.6	1.1	0.75	0.53	0.37	0.27	0.20	0.15	0.11
8.8	0.69	0.50	0.34	0.25	0.18	0.14	0.11	0.08
9.0	0.44	0.31	0.23	0.17	0.13	0.10	0.08	0.07
	Salinity = 20 g/kg							
7.0	44	30	21	14	9.7	6.6	4.7	3.1
7.2	27	19	13	9.0	6.2	4.4	3.0	2.1
7.4	18	12	8.1	5.6	4.1	2.7	1.9	1.3
7.6	11	7.5	5.3	3.4	2.5	1.7	1.2	0.84
7.8	6.9	4.7	3.4	2.3	1.6	1.1	0.78	0.53
8.0	4.4	3.0	2.1	1.5	1.0	0.72	0.50	0.34
8.2	2.8	1.9	1.3	0.94	0.66	0.47	0.31	0.24
8.4	1.8	1.2	0.84	0.59	0.44	0.30	0.22	0.16
8.6	1.1	0.78	0.56	0.41	0.28	0.20	0.15	0.12
8.8	0.72	0.50	0.37	0.26	0.19	0.14	0.11	0.08
9.0	0.47	0.34	0.24	0.18	0.13	0.10	0.08	0.07
	Salinity = 30 g/kg							
7.0	47	31	22	15	11	7.2	5.0	3.4
7.2	29	20	14	9.7	6.6	4.7	3.1	2.2
7.4	19	13	8.7	5.9	4.1	2.9	2.0	1.4
7.6	12	8.1	5.6	3.7	3.1	1.8	1.3	0.90
7.8	7.5	5.0	3.4	2.4	1.7	1.2	0.81	0.56
8.0	4.7	3.1	2.2	1.6	1.1	0.75	0.53	0.37
8.2	3.0	2.1	1.4	1.0	0.69	0.50	0.34	0.25
8.4	1.9	1.3	0.90	0.62	0.44	0.31	0.23	0.17
8.6	1.2	0.84	0.59	0.41	0.30	0.22	0.16	0.12
8.8	0.78	0.53	0.37	0.27	0.20	0.15	0.11	0.09
9.0	0.50	0.34	0.26	0.19	0.14	0.11	0.08	0.07

Table 4. Freshwater Water Effect Ratios and Site Specific Criteria Equations

Parameter	Acute			Chronic
	$WER \times e^{(m_a [\ln \text{Hardness}] + b_a)}$			$(\text{Acute Site Specific} \times 2) \div \text{National Acute:Chronic Ratio}$
	WER [@]	m _a =	b _a =	National Acute:Chronic Ratio
Cadmium	2.2	1.128	-3.828	--
Copper	4.77	0.9422	-1.464	2.823
Lead	0.19	1.273	-1.46	51.29
Silver	2.85	1.72	-6.52	--
Zinc	1.63	0.8473	0.8604	2.208

[@] WER = Water Effect Ratio

-- = no recommended value, use chronic value as calculated in Table 2.

- NOTE: 1). Resulting acute and chronic site specific criteria are as total recoverable metals. The conversion factors noted in Tables 1 and 2 cannot be applied to site specific criteria.
- 2). These WERs and resulting site specific criteria apply only to the segments of the Pawtuxet River classified as B1 (see Appendix A).

Table 5. 126 Priority Pollutants

The following comprise the list of toxic pollutants designated pursuant to Section 307(a)(1) of the Act

1. acenaphthene
2. acrolein
3. acrylonitrile
4. benzene
5. benidine
6. carbon tetrachloride (tetrachloromethane)

Chlorinated Benzenes

7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene

Chlorinated Ethanes

10. 1,2-dichloroethane
11. 1,1,1-trichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. chloroethane

Chloroalkyl Ethers

17. bis(2-chloroethyl) ether
18. 2-chloroethyl vinyl ether

Chlorinated Napthalene

19. 2-chloronapthalene

Chlorinated Phenols

20. 2,4,6-trichlorophenol
21. 4-chloro-3-methylphenol
22. chloroform (trichloromethane)
23. 2-chlorophenol

Dichlorobenzenes

24. 1,2-dichlorobenzene
25. 1,3-dichlorobenzene
26. 1,4-dichlorobenzene

Dichlorobenzidine

27. 3,3-dichlorobenzidine

Dichloroethylenes

28. 1,1-dichloroethylene
29. 1,2-trans-dichloroethylene
30. 2,4-dichlorophenol

Table 5. 126 Priority Pollutants, cont.

Dichloropropane and Dichloropropene

- 31. 1,2-dichloropropane
- 32. 1,3-dichloropropene (cis and trans isomers)

- 33. 2,4-dimethylphenol

Dinitrotoluene

- 34. 2,4-dinitrotoluene
- 35. 2,6-dinitrotoluene

- 36. 1,2-diphenylhydrazine
- 37. ethylbenzene
- 38. fluoranthene

Haloethers

- 39. 4-chlorophenyl phenyl ether
- 40. 4-bromophenyl phenyl ether
- 41. bis(2-chloroisopropyl) ether
- 42. bis(2-chlorethoxy) methane

Halomethanes

- 43. methylene chloride (dichloromethane)
- 44. methyl chloride (chloromethane)
- 45. methyl bromide (bromomethane)
- 46. bromoform (tribromomethane)
- 47. dichlorobromomethane
- 48. chlorodibromomethane

- 49. hexachlorobutadiene
- 50. hexachlorocyclopentadiene
- 51. isophorone
- 52. naphthalene
- 53. nitrobenzene

Nitrophenols

- 54. 2-nitrophenol
- 55. 4-nitrophenol
- 56. 2,4-dinitrophenol

- 57. 4,6-dinitro-2-methylphenol

Nitrosamines

- 58. N-nitrosodimethylamine
- 59. N-nitrosodiphenylamine
- 60. N-nitrosodi-n-propylamine

- 61. pentachlorophenol
- 62. phenol

Table 5. 126 Priority Pollutants, cont.

Phthalate Esters

- 63. bis-(2-ethylhexyl) phthalate
- 64. butyl benzyl phthalate
- 65. di-n-butyl phthalate
- 66. di-n-octyl phthalate
- 67. diethyl phthalate
- 68. dimethyl phthalate

Polynuclear Aromatic Hydrocarbons

- 69. benzo(a)anthracene (1,2-benzanthracene)
- 70. benzo(a)pyrene (3,4-benzopyrene)
- 71. 3,4-benzofluoranthene
- 72. benzo(k)fluorathene (11,12-benzofluoranthene)
- 73. chrysene
- 74. acenaphthylene
- 75. anthracene
- 76. benzo(ghi)perylene (1,12-benzoperylene)
- 77. fluorene
- 78. phenanthrene
- 79. dibenzo(ah)anthracene (1,2,5,6-dibenzanthracene)
- 80. indeno (1,2,3-cd) pyrene (2,3-o-phenylenepyrene)
- 81. pyrene

- 82. tetrachloroethylene
- 83. toluene
- 84. trichloroethylene
- 85. vinyl chloride (chloroethylene)

Pesticides and Metabolites

- 86. aldrin
- 87. dieldrin
- 88. chlordane (technical mixture and metabolites)

DDT and Metabolites

- 89. 4,4' -DDT
- 90. 4,4' -DDE (p,p' -DDE)
- 91. 4,4' -DDD (p,p' -TDE)

Endosulfan and Metabolites

- 92. a-endosulfan-Alpha
- 93. b-endosulfan-Beta
- 94. endosulfan sulfate

Endrin and Metabolites

- 95. endrin
- 96. endrin aldehyde

Heptachlor and Metabolites

- 97. heptachlor
- 98. heptachlor epoxide

Table 5. 126 Priority Pollutants, cont.

Hexachlorocyclohexane

- 99. a-BHC-Alpha
- 100. b-BHC-Beta
- 101. g-BHC (lindane) Gamma
- 102. d-BHC-Delta

Polychlorinated Biphenyls (PCBs)

- 103. PCB-1242 (Arochlor 1242)
- 104. PCB-1254 (Arochlor 1254)
- 105. PCB-1221 (Arochlor 1221)
- 106. PCB-1232 (Arochlor 1232)
- 107. PCB-1248 (Arochlor 1248)
- 108. PCB-1260 (Arochlor 1260)
- 109. PCB-1016 (Arochlor 1016)
- 110. toxaphene

Metals, Asbestos and Cyanide

- 111. antimony and compounds
- 112. arsenic and compounds
- 113. asbestos
- 114. beryllium and compounds
- 115. cadmium and compounds
- 116. chromium and compounds
- 117. copper and compounds
- 118. cyanides
- 119. lead and compounds
- 120. mercury and compounds
- 121. nickel and compounds
- 122. selenium and compounds
- 123. silver and compounds
- 124. thallium and compounds
- 125. zinc and compounds
- 126. 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)

**RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER RESOURCES**

APPENDIX C

**POLICY ON THE IMPLEMENTATION OF THE ANTIDEGRADATION
PROVISIONS OF THE
RHODE ISLAND WATER QUALITY REGULATIONS**

July 2006

WATER QUALITY REGULATIONS APPENDIX C

I. Introduction - Antidegradation Standard

Rule 18 of the Rhode Island Water Quality Regulations is based on the Federal Antidegradation Policy requirements (40 CFR 131.12) and adopted under the authority of Chapter 46-12, 42-17.1 and 42-35 of the General Laws of Rhode Island, as amended. Antidegradation is one of the minimum elements required in State Water Quality Standards. The provisions of the State Antidegradation Regulations have as their objective the maintenance and protection of various levels of water quality and uses. The Rhode Island Antidegradation provisions consist of four (4) tiers of water quality protection which are defined in general terms below and in more specific terms in subsequent sections of this policy:

- Tier 1 - Protection of Existing Uses - In all surface waters, existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
- Tier 2 - Protection of Water Quality in High Quality Waters - In waters where the existing water quality exceeds levels necessary to support propagation of fish and wildlife, and recreation in and on the water, that quality shall be maintained and protected, except for insignificant changes in water quality as determined by the Director and in accordance with this Antidegradation Implementation Policy, as amended. In addition, the Director may allow significant degradation which is determined to be necessary to achieve important economic or social benefits to the State, in accordance with this Antidegradation Implementation Policy, as amended.
- Tier 2½ - Protection of Water Quality for SRPWs - Where high quality waters constitute a SRPW, there shall be no measurable degradation of the existing water quality necessary to protect the characteristic(s) which cause the waterbody to be designated as an SRPW. Notwithstanding that all public drinking water supplies are SRPWs, public drinking water suppliers may undertake temporary and short term activities within the boundary perimeter of a public drinking water supply impoundment for essential maintenance or to address emergency conditions in order to prevent adverse effects on public health or safety, provided that these activities comply with the requirements set forth in Rule 18.B. (Tier 1 Protection of Existing Uses) and Rule 18.C. (Tier 2 Protection of Water Quality in High Quality Waters).
- Tier 3 - Protection of Water Quality for ONRWs - Where high quality waters constitute an Outstanding National Resource, that water quality shall be maintained and protected. The State may allow some limited activities that result in temporary and short-term changes in the water quality of an ONRW. Such activities must not permanently degrade water quality or result in water quality lower than that necessary to protect the existing uses in the ONRW.

II. Applicability

Antidegradation applies to all new or increased projects or activities which may lower water quality or affect existing water uses, including but not limited to all 401 Water Quality Certification reviews and any new, reissued, or modified RIPDES permits. This Antidegradation Implementation Policy describes the general strategy the State will use to determine on a case-by-case basis whether, and to what extent, water quality may be lowered.

III. Definitions

"Assimilative Capacity" means the amount of a pollutant or pollutants that can safely be released to a waterbody or segment of a waterbody under the most adverse conditions, as defined in Rule 8.E. of the Water Quality Regulations, which will not cause any violations of applicable water quality criteria nor cause measurable harm or alteration to the natural biological community found therein.

"Background" means the water quality upstream of all point and nonpoint sources of pollution.

"Best Management Practices (BMPs)" means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of and impacts upon waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

"Best Professional Judgement (BPJ)" means a determination, based on best engineering and/or scientific practices and best management practices, involving any pollutant, combination of pollutants or practice(s), on a case-by-case basis, which is determined by the Director to be necessary to carry out the provisions of the Clean Water Act and any applicable chapters of the General laws of Rhode Island. BPJ can be used to set Best Available Technology Economically Achievable, Best Conventional Pollutant Control Technology, Best Practicable Control Currently Available or BMP limitations pursuant to the Clean Water Act either in the absence of an applicable promulgated effluent guideline or where promulgated effluent limitation guidelines only apply to certain aspects of the discharge's operation or to certain pollutants.

"Designated Uses" are those uses specified in water quality standards for each waterbody or segment whether or not they are being attained. In no case shall assimilation or transport of pollutants be considered a designated use.

"Existing use" means those designated uses and any other uses that do not impair the designated uses and that are actually attained in a waterbody on or after November 28, 1975; except that in no case shall assimilation or transport of pollutants be considered an existing use.

"High Quality Waters" include all Class A and SA surface waters as well as other surface waters whose quality exceeds the minimum water quality criteria for any State aquatic life and/or human health criteria or water quality standards assigned to them; or whose

qualities and characteristics make them critical to the propagation or survival of important living natural resources; or those waters constituting a Special Resource Protection Water or an Outstanding National Resource Water.

"Outstanding National Resource Waters (ONRWs)" are surface waters of National and State Parks, Wildlife Refuges, and other such waters designated as having special recreational or ecological value.

"Public Drinking Water Supplier" means any city, town, district, or other municipal, public, private corporation or company, or non-profit entity authorized to engage in the collection and treatment of surface water for the purposes of distribution of drinking water in Rhode Island and whose source of drinking water is a surface water in Rhode Island.

"Public Drinking Water Supply" means the source of surface water for a public drinking water supplier.

"Special Resource Protection Waters (SRPW)" are surface waters identified by the Director as having significant recreational or ecological uses, and may include but are not limited to: wildlife refuge or management areas; public drinking water supplies; State and Federal parks; State and Federal designated Estuarine Sanctuary Areas; waterbodies containing critical habitats, including but not limited to waterbodies identified by the RIDEM Natural Heritage Program as critical habitat for rare or endangered species; wetland types or specific wetlands listed as rare, threatened, endangered, of special interest or of special concern by the Rhode Island Natural Heritage Program; waterbodies identified by the U. S. Department of the Interior on the Final List of Rivers for potential inclusion in the National Wild and Scenic Rivers System.

"Water Quality Criteria" means elements of the State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use.

"Water Quality Standard" means provisions of State or Federal law which consists of a designated use(s) and water quality criteria for the waters of the State. Water quality standards also consist of an antidegradation policy.

IV. Preconditions for Implementation of Antidegradation Procedures

- A. At the onset of the antidegradation review, a determination by the State, of whether the proposed activity can be considered a new or increased activity, must be made.
 - 1. A new activity in terms of application of this Antidegradation Implementation Policy shall refer to any activity which commenced after November 28, 1975.
 - 2. An increased activity shall refer to:
 - (a). a proposed increase in loadings to a waterbody. For discharges

covered by existing RIPDES permits an evaluation of an increased loading shall constitute a comparison of the present permit limit with the newly calculated permit limit. If the new permit limit is less than or equal to the old limit, it would not be considered an increased activity. If the comparison indicates that the new permit limit is greater than the old limit, it would be considered an increased activity.

(b). an increase in a flow alteration over the existing use.

If the above evaluations result in a determination that the proposed activity is not a new or increased activity, then there would be no further review of the proposed activity under the Antidegradation Implementation Policy. If the above evaluations result in a determination that the proposed activity is a new or increased activity, then the activity will be reviewed for consistency with this Antidegradation Implementation Policy.

V. Tier 1 - Protection of Existing Uses

A. General

This provision applies to all surface waters. An existing use can be established by demonstrating that a use(s) has actually occurred since November 28, 1975, and the water quality is suitable to allow the existing use or by demonstrating that although a designated use(s) has not occurred the water quality is suitable to allow such a use(s) to occur, unless there are physical problems which prevent the use and which cannot be remedied. Under Tier 1, a proposed activity or discharge cannot partially or completely eliminate any existing uses nor the water quality needed to maintain and protect those uses. In addition, the proposed activity cannot violate the class-specific criteria for minimum water quality of the assigned water quality standard of a waterbody. The more stringent of instream aquatic life criteria or applicable human health criteria for toxic pollutants must be met in all waters, regardless of the classification. The Department may make requests for evidence/data for applications of proposed activities or discharges in accordance with Section VI.B.3. of this policy.

VI. Tier 2 - Protection of Water Quality in High Quality Waters

A. General

In a waterbody where, for any parameter, the existing water quality exceeds that level necessary to support the propagation of fish and wildlife and recreation in and on the waters, regardless of the use designation, that water shall be considered high quality for that parameter. All parameters do not need to be better quality than the ambient criteria for the water to be deemed a "high quality water". Instead, a waterbody is assessed as being high quality on a parameter-by-parameter basis.

That high quality shall be maintained and protected, except for insignificant changes in water quality as determined by the Director and in accordance with

this Antidegradation Implementation Policy, as amended (See Section VI.B. below). Significant changes in water quality may be allowed if it can be proven to the Director by a preponderance of clear and scientifically valid evidence having a probative value, and the Director finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the RI Continuing Planning Process, that allowing the water quality degradation is necessary to accommodate important economic and social benefit in the area in which the receiving waters are located (See Section VI.C below). In allowing a change in water quality, significant or insignificant, all reasonable measures to minimize the change shall be implemented.

In allowing any such significant change in water quality, the Director shall assure water quality adequate to fully protect existing and designated uses. Adequate scientifically valid documentation shall demonstrate that existing and designated uses, water quality to protect those uses, and all applicable water quality standards, will be fully protected. Further, achievement of 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 controls, shall be assured.

If the waterbody is a Special Resource Protection Water (SRPW), a special subset of High Quality Waters, additional requirements appear in Tier 2½ of this Antidegradation Policy.

If the waterbody is an Outstanding National Resource Water (ONRW), a special subset of High Quality Waters, additional requirements appear in Tier 3 of this Antidegradation Policy.

B. Assessment of protection of high quality waters consists of the following processes:

1. Assess waterbody for high quality on a parameter-by-parameter basis: This step involves characterizing the existing instream water quality and comparing that to the State's instream water quality criteria to assess for high quality water on a parameter-by-parameter basis.

Instream water quality is characterized by the applicable flows associated with the most adverse conditions as stated in Rule 8.E. of these Regulations, background water quality levels (as determined by the Director), and all point source loadings and nonpoint source contributions and in accordance with Rule 10.B. of these Regulations.

If this analysis indicates that the water is not high quality, then Tier 1 of the policy is the applicable level of protection.

If this analysis indicates that the water is high quality, then continue with the Tier 2 antidegradation evaluation.

2. Define the remaining assimilative capacity of the receiving water: The remaining assimilative capacity or buffer of the receiving water is

equivalent to the difference between the State's instream water quality criteria and the existing instream water quality.

3. Request and obtain evidence/data for applications involving activities potentially impacting High Quality Waters: If it is determined that a high quality water is involved in a request for an approval of a discharge or other activity, and sufficient supplemental data is not available, RIDEM may request that the applicant provide, at a minimum, the following information prepared by a qualified professional. All engineering analyses and documentation must be prepared, stamped, and signed by a professional engineer registered in the State pursuant to Chapter 5-8 of the of the General Laws of Rhode Island of 1956, as amended. All biological and scientific analyses and documentation shall be prepared by individuals qualified in the scientific field.
 - a. Adequate recent instream water quality data, and engineering analyses to calculate probable water quality impacts due to the discharge or activity, and evidence that the existing instream water uses, and the level of water quality necessary to protect those uses will be maintained and protected.
 - b. Adequate scientific/engineering-based evidence describing the magnitude and duration of any lowering of water quality due to the discharge or activity by itself, and in combination with other discharges or activities presently occurring. Such evidence must also show that all water quality criteria applicable to the High Quality Water in question will not be violated.
 - c. All documentation required by any other applicable RI Water Quality Regulation or which the Director determines is necessary.

Where RIDEM determines that the information/documentation provided by the applicant is insufficient to make a valid determination, the Department has the authority to require additional information from the applicant before a decision is made. Failure to provide the required information shall result in denial of all approvals for the activity or discharge.

4. Determine if the discharge or activity will significantly impact the waterbody: For any water quality parameter, increments of water quality within any High Quality Water which exceed the minimum water quality criteria of that water's assigned water quality standard, constitute an important public resource to the State. Degradation of such increments by the applicant shall only be allowed if the extent of degradation expected can be adequately documented, and it can be demonstrated by the applicant through full intergovernmental coordination and public participation process that the discharge or activity is necessary to achieve important economic or social benefit to the State, as required in VI.A above.

Theoretically, any new or increased discharge or activity could lower existing water quality and thus require the important benefit demonstration. However, RIDEM will: 1) evaluate applications on a case-by-case basis, using BPJ and all pertinent and available facts, including scientific and technical data and calculations as provided by the applicant; and 2) determine whether the incremental loss is significant enough to require the important benefits demonstration described below. Some of the considerations which will be made to determine if an impact is significant in each site specific decision are: 1) percent change in water quality parameter value and their temporal distribution; 2) quality and value of the resource; 3) cumulative impact of discharges and activities on water quality to-date; 4) measurability of the change; 5) visibility of the change; 6) impact on fish and wildlife habitat; and 7) impact on potential and existing uses.

As a general guide, any discharge or activity which consumes greater than 20% of the remaining assimilative capacity (See Section VI.B.2) will be considered a significant impact and will be required to demonstrate important economic or social benefits to justify the activity (See Section VI.C. below). However, on a case-by-case basis, any proposed percent consumption of the remaining assimilative capacity may be deemed significant and invoke full requirements to demonstrate important economic or social benefits. (For example, Class A waters allow a maximum level of 5 mg/l of parameter X at any time. If a High Quality Water has an actual maximum level of 4 mg/l of parameter X, there is an assimilative capacity of 1 mg/l of parameter X. Following the above guidance, any activity which is projected to increase the level of parameter X by greater than 20% of this 1 mg/l assimilative capacity (= 0.2 mg/l) under the most adverse conditions, must go through the demonstration of important economic or social benefit.)

C. Demonstration that the discharge or activity is necessary to achieve important economic or social benefits to the State:

When the Department determines from BPJ and documentation provided by the applicant that a proposed new or increased discharge or activity would result in a significant impact to the existing water quality of a High Quality waterbody, the Department requires that the applicant demonstrate by a preponderance of clear and scientifically valid evidence having a probative value that the discharge or activity is necessary to achieve important economic or social benefits to the State. The applicant shall submit evidence to the Department, including but not limited to:

1. Adequate scientific and technical evidence describing the magnitude and duration of the lowering of water quality.
2. Adequate evidence detailing the extent of the important economic or social benefits that will accrue to the State from the proposed activity.

3. Adequate scientific and technical evidence which demonstrates that the discharge or activity is necessary and methods of alternative production, alternative methods of treatment, or alternative sites for the activity will not achieve the important social or economic benefits.

Where RIDEM determines that the information/documentation provided by the applicant is insufficient to make a valid determination, the Department has authority to require additional information from the applicant before a decision is made.

Upon receipt and review of the applicant's antidegradation socioeconomic benefits demonstration, the Department may either determine that the significant change in water quality is not necessary to provide important economic or social benefit and deny the proposed new or increased discharge, or tentatively accept the demonstration and provide the opportunity for public comment on the action that may lower water quality in a high quality waterbody. The public participation requirement will be met by providing the public with the opportunity to comment and the opportunity to request a public hearing (See Section VI.D. below).

D. Public Participation:

When the Department determines that a proposed new or increased discharge or activity would result in either significant or insignificant impacts to the existing water quality of any High Quality waterbody, the Department will cause and approve public notice to be ~~given by the applicant~~, in accordance with Rhode Island General Laws 42-35, and said notice shall include: 1) description of the proposed activity; 2) statement of the State's antidegradation policy and how the activity complies with the State's policy; 3) a determination that existing uses will be maintained and protected; 4) summary of the expected water quality impact; 5) summary of the important economic or social benefits to the State. The notice shall invite written comments to be submitted to DEM, Water Resources, and shall provide an opportunity to request a public hearing. For RIPDES permit related activities, this public notice may be a part of the normal public participation procedures involved with the issuance of a RIPDES permit. Intergovernmental coordination and review will be fulfilled by submitting a copy of the public notice to the following agencies, requesting comment to be submitted to DEM, Water Resources by the public comment deadline.

State Agencies

RIDEM - Fish and Wildlife; Environmental Coordination; Groundwater and ISDS; Freshwater Wetlands; Water Supply Management; Natural Heritage Program.

Governor's Policy Planning Office; RI Division of Statewide Planning, Department of Administration; RI Water Resources Board; RI Department of Economic Development; RI Office of Drinking Water Quality, Department of Health; RI Coastal Resources Management Council (if applicable).

Federal Agencies

US EPA Region I; US Army Corps of Engineers; US Fish and Wildlife Service; National Marine Fisheries Service; National Park Service.

Once all public comment has been received (following the comment deadline), the Director of RIDEM or the Director's designee will respond to all significant comments. If significant evidence of need in terms of public interest, significant new technical information, or significant and valid disagreement as to technical conclusions exist, the Director or the Director's designee will hold a public hearing.

Following this public participation process, the Director or the Director's designee will render a decision as to the allowance or denial for such activity to take place.

If the application is denied, the applicant may revise the submittal to decrease or eliminate the projected impact to High Quality Waters, and resubmit the application for consideration under the full review process.

VII. Tier 2½ - Protection of Water Quality for SRPWs

Special Resource Protection Waters (SRPWs) are a special subset of High Quality Waters. SRPWs are subject not only to Tier 2 protection but also special protection under Tier 2½ of the Antidegradation Policy. Waterbodies which have been designated as SRPWs are listed in Appendix D of the Water Quality Regulations.

Under Tier 2½, there shall be no measurable degradation of the existing water quality necessary to protect the characteristic(s) which cause the waterbody to be designated as a SRPW. The new or increased discharge or activity will not be allowed unless the applicant can provide adequate scientific and technical documentation and engineering plans which can prove, to the satisfaction of the Director, that specific pollution controls and/or other mitigation measures and BMPs will completely eliminate any measurable impacts to water quality necessary to protect the characteristics which cause the waterbody to be designated a SRPW. If the RIDEM, using BPJ and scientific and technical knowledge of proper modern pollution control engineering practices, agrees that the specified pollution controls and/or BMPs will protect the SRPW from all measurable degradation, those agreed-to measures will be conditions required of the applicant in an approval. Any avoidance of such conditions by the applicant will result in automatic revocation of the approval and potential enforcement action. The burden of proof rests on the applicant. Notwithstanding that all public drinking water supplies are SRPWs, public drinking water suppliers may undertake temporary and short term activities within the boundary perimeter of a public drinking water supply impoundment for essential maintenance or to address emergency conditions in order to prevent adverse effects on public health or safety, provided that these activities comply with the requirements set forth in Rule 18.B. (Tier 1 Protection of Existing Uses) and Rule 18.C. (Tier 2 Protection of Water Quality in High Quality Waters).

VIII. Tier 3 - Protection of Water Quality for ONRWs

Outstanding National Resource Waters (ONRWs) are a special subset of High Quality Waters. ONRWs are subject not only to Tier 2 protection but also special protection under Tier 3 of the Antidegradation Policy.