

10/09/02

[REVISOR] CMR/DI AR3321

1 Minnesota Pollution Control Agency

2 Adopted Permanent Rules Relating to the Water Quality Assessment

3 Process

DEC 20

ADMINISTRATIVE

4 7050.0150 DETERMINATION OF COMPLIANCE WITH WATER QUALITY HEARINGS

5 STANDARDS AND WATER QUALITY CONDITION.

6 Subpart 1. Policy and scope. The intent of the state is
7 to protect and maintain surface waters in a condition which
8 allows for the maintenance of all existing beneficial uses. The
9 condition of a surface water body is determined by its physical,
10 chemical, and biological qualities. The narrative water quality
11 standards in subpart 3 prescribe the qualities or properties of
12 surface waters that are necessary for the protection of
13 designated public uses and benefits. If the narrative standards
14 in this part are exceeded, it is considered indicative of a
15 polluted condition which is actually or potentially deleterious,
16 harmful, detrimental, or injurious with respect to the
17 designated uses of the waters of the state.

18 Subparts 5 to 7 list factors the commissioner will use to
19 determine if surface waters are in compliance with applicable
20 narrative standards in subpart 3. Determination of compliance
21 with the narrative standards will be made for individual water
22 bodies on a case by case basis.

23 Subp. 2. Other standards preserved. The requirements of
24 this part are in addition to the application of other narrative
25 or numerical water quality standards in this chapter. If the
26 requirements of this part conflict with any other narrative or
27 numerical standard in this chapter, the more stringent standard

1 applies.

2 Subp. 3. Narrative standards. For all Class 2 waters the
3 aquatic habitat, which includes the waters of the state and
4 stream bed, shall not be degraded in any material manner, there
5 shall be no material increase in undesirable slime growths or
6 aquatic plants, including algae, nor shall there be any
7 significant increase in harmful pesticide or other residues in
8 the waters, sediments, and aquatic flora and fauna; the normal
9 fishery and lower aquatic biota upon which it is dependent and
10 the use thereof shall not be seriously impaired or endangered,
11 the species composition shall not be altered materially, and the
12 propagation or migration of the fish and other biota normally
13 present shall not be prevented or hindered by the discharge of
14 any sewage, industrial waste, or other wastes to the waters.

15 Subp. 4. Definitions. For the purposes of this part, the
16 following terms have the meanings given them.

17 A. "Chlorophyll-a" means a pigment in green plants
18 including algae. The concentration of chlorophyll-a, expressed
19 in weight per unit volume of water, is a measurement of the
20 abundance of algae.

21 B. "Ecoregion" means an area of relative homogeneity
22 in ecological systems based on similar soils, land use, land
23 surface form, and potential natural vegetation.

24 C. "Hydraulic residence time" means the time water
25 resides in a basin, ~~usually a lake or reservoir,~~ or,
26 alternately, the time it would take to fill the basin if it were
27 empty. ~~Hydraulic residence time is often determined over a~~

1 ~~range-of-flow-conditions.~~

2 D. "Impaired water" or "impaired condition" means a
3 water body that does not meet applicable water quality standards
4 or fully support applicable beneficial uses, due in whole or in
5 part to ~~pollutants~~ water pollution from point or nonpoint
6 sources, or any combination thereof.

7 E. "Index of biological integrity" or "IBI" means an
8 ~~index, usually numeric, that represents the health of aquatic~~
9 ~~communities. The IBI is~~ developed by measuring attributes of
10 the an aquatic community that change in quantifiable and
11 predictable ways in response to human disturbance, representing
12 the health of that community.

13 F. "Lake morphometry" means the physical
14 characteristics of the lake basin, ~~including, for example that~~
15 are reasonably necessary to determine the shape of a lake, such
16 as maximum length and width, maximum and mean depth, area,
17 volume, and shoreline configuration.

18 G. "Mixing status" means the frequency of complete
19 mixing of the lake water from surface to bottom, which is
20 determined by whether temperature gradients are established and
21 maintained in the water column during the summer season. ~~Mixing~~
22 ~~is typically a function of the lake's location, morphometry, and~~
23 ~~exposure to wind energy.~~

24 H. "Nuisance algae bloom" means an excessive
25 population of algae that ~~causes, for example,~~ is characterized
26 by obvious green or blue-green pigmentation in the water,
27 floating mats of algae, reduced light transparency, aesthetic

1 degradation, loss of recreational value use, possible harm to
2 the aquatic community, or possible toxicity to animals and
3 humans. Algae blooms are measured ~~using-reliable-data-for~~
4 ~~relevant-factors-including,-but-not-limited-to,~~ through tests
5 for chlorophyll-a, observations using a Secchi disk, and
6 observations of impaired recreational and aesthetic
7 conditions observed by the users of the water body, or any other
8 reliable data that identifies the population of algae in an
9 aquatic community.

10 I. "Readily available and reliable data and
11 information" means chemical, biological, and physical data and
12 information determined by the commissioner to meet the quality
13 assurance and quality control requirements in subpart 8, and
14 that are normally not more than ten years old from the time it
15 is they are used for the assessment. A subset of data in the
16 ten-year period, or data more than ten years old can be used if
17 credible scientific evidence shows that the-older these data is
18 are representative of current conditions.

19 J. "Reference water body" means a water body least
20 impacted by point or nonpoint sources of pollution that is used
21 representative of water bodies in the same ecoregion or
22 watershed. Reference water bodies are used as a base for
23 comparing the quality of similar water bodies in the same
24 ecoregion or watershed.

25 K. "Secchi disk transparency" means the average water
26 depth of the point where a weighted white or black and white
27 disk disappears when viewed from the shaded side of a boat, and

1 the point where it reappears upon raising it after it has been
2 lowered beyond visibility. The Secchi disk measures water
3 clarity and is usually used in lakes.

4 L. "Summer-average" means the a representative
5 average of concentrations or measurements of nutrient enrichment
6 factors, taken over one summer growing season, ~~usually~~ from June
7 1 through September 30.

8 M. "Transparency tube" means a graduated clear
9 plastic tube, 24 inches or more in length by 1-1/2 inches in
10 diameter, with a stopper at the bottom end, the inside surface
11 of which is painted black and white. The tube is filled with
12 water from a surface water; the water is released through a
13 valve at the bottom end until the painted surface of the stopper
14 is just visible through the water column when viewed from the
15 top of the tube. The depth of water at the point of initial
16 visibility is the transparency. The transparency tube measures
17 water clarity and is usually used in rivers and streams.

18 N. "Trophic status or condition" means the
19 productivity of a lake as measured by the phosphorus content,
20 algae abundance, and depth of light penetration.

21 O. "Water body" means a lake, reservoir, wetland, or
22 a geographically defined portion of a river or stream.

23 Subp. 5. Impairment of waters due to excess algae or plant
24 growth. In evaluating whether the narrative standards in
25 subpart 3, which prohibit any material increase in undesirable
26 slime growths or aquatic plants including algae ~~is~~, are being
27 met, the commissioner will use all readily available and

1 reliable data and information for relevant the following factors
2 of use impairment including, ~~but not limited to, the factors~~
3 ~~listed in items A to E. The commissioner may consider other~~
4 ~~scientifically objective, credible, and supportable factors that~~
5 ~~are not listed in this subpart, but in all cases a finding of an~~
6 ~~impaired condition must be supported by data showing elevated~~
7 ~~levels of nutrients in item A, and at least one factor showing~~
8 ~~impaired conditions resulting from nutrient over enrichment in~~
9 ~~items B to E.~~

10 ~~Assessment of trophic status and the response of a given~~
11 ~~water body to nutrient enrichment will take into account the~~
12 ~~morphometry, hydraulic residence time, mixing status, watershed~~
13 ~~size, location, and other factors that affect trophic status,~~
14 ~~appropriate for that geographic region. The factors in this~~
15 ~~subpart normally apply to lakes, however, the commissioner may~~
16 ~~apply them to rivers, streams, and wetlands when the application~~
17 ~~of the factors is scientifically justified. The factors~~
18 ~~referred to in this subpart are as follows:~~

19 A. representative summer-average concentrations of
20 total phosphorus and total nitrogen measured in the water body
21 throughout the summer growing season;

22 B. representative summer-average concentrations of
23 chlorophyll-a measured in the water body throughout the summer
24 growing season;

25 C. representative measurements of light transparency
26 in the water body, as measured with a Secchi disk in lakes or a
27 transparency tube in rivers and streams, throughout the growing

1 season; and

2 D. ~~the-magnitude, duration, and frequency of nuisance~~
3 ~~algae blooms in the water body, and documented impaired~~
4 ~~recreational and aesthetic conditions observed by the users of~~
5 ~~the water body, due to excess algae or plant growth, reduced~~
6 ~~transparency, or other deleterious conditions caused by nutrient~~
7 ~~over-enrichment, and any other scientifically objective,~~
8 ~~credible, and supportable factor.~~

9 E. ~~failure of an individual water body to meet~~
10 ~~documented expectations of trophic status, based on readily~~
11 ~~available and reliable data for the water body, when compared to~~
12 ~~data for reference water bodies appropriate for that ecoregion.~~

13 A finding of an impaired condition must be supported by
14 data showing elevated levels of nutrients in item A, and at
15 least one factor showing impaired conditions resulting from
16 nutrient over-enrichment in items B and C. The trophic status
17 data described in items A to D must be assessed in light of the
18 magnitude, duration, and frequency of nuisance algae blooms in
19 the water body; and documented impaired recreational and
20 aesthetic conditions observed by the users of the water body due
21 to excess algae or plant growth, reduced transparency, or other
22 deleterious conditions caused by nutrient over-enrichment.

23 Assessment of trophic status and the response of a given
24 water body to nutrient enrichment will take into account the
25 trophic status of reference water bodies; and all relevant
26 factors that affect the trophic status of the given water body
27 appropriate for its geographic region, such as the morphometry,

1 hydraulic residence time, mixing status, watershed size, and
2 location. The factors in this subpart apply to lakes and, where
3 scientifically justified, to rivers, streams, and wetlands.

4 Subp. 6. Impairment of biological community and aquatic
5 habitat. In evaluating whether the narrative standards in
6 subpart 3, which prohibit serious impairment of the normal
7 fisheries and lower aquatic biota upon which they are dependent
8 and the use thereof, material alteration of the species
9 composition, material degradation of stream beds, and the
10 prevention or hindrance of the propagation and migration of fish
11 and other biota normally present, are being met, the
12 commissioner will consider all readily available and reliable
13 data and information for relevant the following factors of use
14 ~~impairment including, but not limited to, the factors listed in~~
15 ~~items A to D. The commissioner may consider other~~
16 ~~scientifically objective, credible, and supportable factors not~~
17 ~~listed in this subpart, but in all cases a finding of an~~
18 ~~impaired condition must be supported by data for the factors~~
19 ~~listed in at least one of items A to C. The factors listed in~~
20 ~~item D are used to support the biological data described in~~
21 ~~items A to C when habitat data are available.~~

22 ~~The biological quality of any given surface water body will~~
23 ~~be assessed by comparison to the biological conditions~~
24 ~~determined for a set of reference water bodies which best~~
25 ~~represents the most natural condition for that surface water~~
26 ~~body type within a geographic region.:~~

27 A. an index of biological integrity calculated from

1 measurements of attributes of the resident fish community,
2 including measurements of:

- 3 (1) species diversity and composition;
4 (2) feeding and reproduction characteristics; and
5 (3) fish abundance and condition;

6 B. an index of biological integrity calculated from
7 measurements of attributes of the resident aquatic invertebrate
8 community, including measurements of:

- 9 (1) species diversity and composition;
10 (2) feeding characteristics; and
11 (3) species abundance and condition;

12 C. an index of biological integrity calculated from
13 measurements of attributes of the resident aquatic plant
14 community, including measurements of:

- 15 (1) species diversity and composition, including
16 algae; and
17 (2) species abundance and condition;

18 D. a quantitative or qualitative assessment of
19 habitat quality, determined by an assessment of:

- 20 (1) stream morphological features that provide
21 spawning, nursery, and refuge areas for fish and invertebrates;
22 (2) bottom substrate size and variety;
23 (3) variations in water depth;
24 (4) sinuosity of the stream course;
25 (5) physical or hydrological alterations of the
26 stream bed including excessive sedimentation;
27 (6) types of land use in the watershed; ~~or~~ and

1 (7) other scientifically accepted and valid
2 factors of habitat quality; and

3 E. any other scientifically objective, credible, and
4 supportable factors.

5 A finding of an impaired condition must be supported by
6 data for the factors listed in at least one of items A to C.
7 The biological quality of any given surface water body will be
8 assessed by comparison to the biological conditions determined
9 for a set of reference water bodies which best represents the
10 most natural condition for that surface water body type within a
11 geographic region.

12 Subp. 7. Impairment of waters relating to fish for human
13 consumption. In evaluating whether the narrative standards in
14 subpart 3, which prevent harmful pesticide or other residues in
15 aquatic flora or fauna, are being met, the commissioner will use
16 the residue levels in fish muscle tissue established by the
17 Minnesota Department of Health to identify surface waters
18 supporting fish for which the Minnesota Department of Health
19 recommends a reduced frequency of fish consumption for the
20 protection of public health. A water body will be considered
21 impaired when the recommended consumption frequency is less than
22 one meal per week, such as one meal per month, for any member of
23 the population. That is, a water body will not be considered
24 impaired if the recommended consumption frequency is one meal
25 per week, or any less restrictive recommendation such as two
26 meals per week, for all members of the population. The impaired
27 condition must be supported with measured data on the

1 contaminant levels in the indigenous fish.

2 Subp. 8. **Determination of compliance.** In making tests or
3 analyses of the waters of the state, sewage, industrial wastes,
4 or other wastes to determine compliance with the standards and
5 water quality condition, samples shall be collected in a manner
6 and place, and of such type, number, and frequency as may be
7 considered necessary by the agency from the viewpoint of
8 adequately reflecting the condition of the waters, the
9 composition of the effluents, and the effects of the pollutants
10 upon the specified uses. The samples shall be collected,
11 preserved, and analyzed following accepted quality control and
12 quality assurance methods, and according to the procedures in
13 Code of Federal Regulations, title 40, part 136. The agency may
14 accept or may develop other methods, procedures, guidelines, or
15 criteria for collecting and analyzing samples and measuring
16 water quality characteristics. The commissioner will retain a
17 record of all impairment decisions using the factors in this
18 part, including all supporting data, for a minimum of eight
19 years.

20 7050.0210 GENERAL STANDARDS FOR DISCHARGERS TO WATERS OF THE
21 STATE.

22 [For text of subps 1 to 4, see M.R.]

23 Subp. 5. **Mixing zones.** Reasonable allowance will be made
24 for dilution of the effluents, which are in compliance with part
25 7050.0211 or 7050.0212, as applicable, following discharge into
26 waters of the state. The agency, by allowing dilution, may
27 consider the effect on all uses of the waters of the state into

1 which the effluents are discharged. The extent of dilution
2 allowed regarding any specific discharge as specified in subpart
3 7 shall not violate the applicable water quality standards.

4 Means for expediting mixing and dispersion of sewage, industrial
5 waste, or other waste effluents in the receiving waters are to
6 be provided so far as practicable when deemed necessary by the
7 agency to maintain the quality of the receiving waters in
8 accordance with applicable standards. Mixing zones must be
9 established by the agency on an individual basis, with primary
10 consideration being given to the following guidelines:

11 A. mixing zones in rivers shall permit an acceptable
12 passageway for the movement of fish;

13 B. the total mixing zone or zones at any transect of
14 the stream should contain no more than 25 percent of the cross
15 sectional area and/or volume of flow of the stream, and should
16 not extend over more than 50 percent of the width;

17 C. mixing zone characteristics shall not be lethal to
18 aquatic organisms;

19 D. for contaminants other than heat, the FAV, as
20 defined in part 7050.0218, subpart 3, item 0, for toxic
21 pollutants should not be exceeded as a one-day mean
22 concentration at any point in the mixing zone;

23 E. mixing zones should be as small as possible, and
24 not intersect spawning or nursery areas, migratory routes, water
25 intakes, nor mouths of rivers; and

26 F. overlapping of mixing zones should be minimized
27 and measures taken to prevent adverse synergistic effects.

1 This subpart applies in cases where a Class 7 water is
2 tributary to a Class 2 water.

3 [For text of subps 6c to 18, see M.R.]

4 7050.0222 SPECIFIC STANDARDS OF QUALITY AND PURITY FOR CLASS 2
5 WATERS OF THE STATE; AQUATIC LIFE AND RECREATION.

6 [For text of subps 1 to 3, see M.R.]

7 Subp. 4. Class 2B waters. The quality of Class 2B surface
8 waters shall be such as to permit the propagation and
9 maintenance of a healthy community of cool or warm water sport
10 or commercial fish and associated aquatic life, and their
11 habitats. These waters shall be suitable for aquatic recreation
12 of all kinds, including bathing, for which the waters may be
13 usable. This class of surface water is not protected as a
14 source of drinking water. The applicable standards are given
15 below, with substances considered carcinogenic followed by a
16 (c). The basis columns to the right of the chronic standards
17 and to the right of the acute standards, indicate whether the
18 chronic and acute standards, respectively, are based on the
19 protection of the aquatic community from adverse toxic effects
20 (Tox.), or the protection of human consumers of sport-caught
21 fish (HH). "NA" means not applicable. Subpart 7, item E,
22 should be referenced for FAV and MS values and "none" noted with
23 an asterisk (*):

24 Substance or 25 Characteristic 26 (c) = carcinogen	27 Units	28 Class 2B 29 Chronic 30 Standard		Class 2B Acute Standards		
		CS	Basis	MS	FAV	Basis
29 Acenaphthene	µg/1	20	HH	56	112	Tox.
30 Acrylonitrile (c)	µg/1	0.89	HH	1140*	2281*	Tox.

1	Alachlor	µg/l	59	Tox.	800	1600	Tox.
2	Aluminum, total	µg/l	125	Tox.	1072	2145	Tox.
3	Ammonia un-ionized	µg/l	40	Tox.	None	None	NA
4	as N						

5 The percent un-ionized ammonia can be calculated for any
6 temperature and pH as described in subpart 2.

7	Anthracene	µg/l	0.035	Tox.	0.32	0.63	Tox.
8	Antimony	µg/l	31	Tox.	90	180	Tox.
9	Arsenic, total	µg/l	53	HH	360	720	Tox.
10	Atrazine	µg/l	10	Tox.	323	645	Tox.
11							
12	Benzene	µg/l	114	Tox.	4487	8974	Tox.
13	Bromoform	µg/l	466	HH	2900	5800	Tox.
14							
15	Cadmium, total	µg/l	Formula	Tox.	Formula	Formula	Tox.
16	Cadmium, total						

17 The CS shall not exceed: $\exp.(0.7852[\ln(\text{total hardness}$
18 $\text{mg/l})]-3.490)$

19 The MS shall not exceed: $\exp.(1.128[\ln(\text{total hardness}$
20 $\text{mg/l})]-1.685)$

21 The FAV shall not exceed: $\exp.(1.128[\ln(\text{total hardness}$
22 $\text{mg/l})]-0.9919)$

23 For hardness values greater than 400 mg/l, 400 mg/l shall
24 be used to calculate the standard.

25 Cadmium standards in µg/l for three hardness values:

26	Hardness (mg/l)	50	100	200
27				
28				
29	Standard: CS	0.66	1.1	2.0
30	MS	15	33	73
31	FAV	31	67	146

33	Carbon tetra-	µg/l	5.9	HH	1750*	3500*	Tox.
34	chloride (c)						
35	Chlordane (c)	ng/l	0.29	HH	1200*	2400*	Tox.
36	Chloride	mg/l	230	Tox.	860	1720	Tox.
37	Chlorine, total	µg/l	11	Tox.	19	38	Tox.
38	residual						

39 Chlorine standard applies to conditions of continuous
40 exposure, where continuous exposure refers to chlorinated
41 effluents that are discharged for more than a total of two
42 hours in any 24-hour period.

43	Chlorobenzene	µg/l	20	HH	423	846	Tox.
44	(Monochlorobenzene)						
45	Chloroform	µg/l	155	Tox.	1392	2784	Tox.
46	Chlorpyrifos	µg/l	0.041	Tox.	0.083	0.17	Tox.

1 Chromium +3, µg/l Formula Tox. Formula Formula Tox.
 2 total

3 Chromium +3, total

4 The CS shall not exceed: $\exp.(0.819[\ln(\text{total hardness}$
 5 $\text{mg/l})]+1.561)$

6 The MS shall not exceed: $\exp.(0.819[\ln(\text{total hardness}$
 7 $\text{mg/l})]+3.688)$

8 The FAV shall not exceed: $\exp.(0.819[\ln(\text{total hardness}$
 9 $\text{mg/l})]+4.380)$

10 For hardness values greater than 400 mg/l, 400 mg/l shall
 11 be used to calculate the standard.

12 Chromium +3 standards in µg/l for three hardness values:

13	Hardness (mg/l)	50	100	200
14				
15				
16	Standard: CS	117	207	365
17	MS	984	1737	3064
18	FAV	1966	3469	6120

19
 20 Chromium +6, µg/l 11 Tox. 16 32 Tox
 21 total

22 Cobalt µg/l 5.0 Tox. 436 872 Tox.

23 Copper, total µg/l Formula Tox. Formula Formula Tox.

24 Copper, total

25 The CS shall not exceed: $\exp.(0.6200[\ln(\text{total hardness}$
 26 $\text{mg/l})]-0.570)$

27 The MS shall not exceed: $\exp.(0.9422[\ln(\text{total hardness}$
 28 $\text{mg/l})]-1.464)$

29 The FAV shall not exceed: $\exp.(0.9422[\ln(\text{total hardness}$
 30 $\text{mg/l})]-0.7703)$

31 For hardness values greater than 400 mg/l, 400 mg/l shall
 32 be used to calculate the standard.

33 Copper standards in µg/l for three hardness values:

34	Hardness (mg/l)	50	100	200
35				
36				
37	Standard: CS	6.4	9.8	15
38	MS	9.2	18	34
39	FAV	18	35	68

40
 41 Cyanide, free µg/l 5.2 Tox. 22 45 Tox.
 42

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1	DDT (c)	ng/l	1.7	HH	550*	1100*	Tox.
2	1,2-Dichloro-	µg/l	190	HH	45,050*	90,100*	Tox.
3	ethane (c)						
4	Dieldrin (c)	ng/l	0.026	HH	1300*	2500*	Tox.
5	Di-2-ethylhexyl	µg/l	2.1	HH	None*	None*	NA
6	phthalate (c)						
7	Di-n-octyl	µg/l	30	Tox.	825	1650	Tox.
8	phthalate						

9 Dissolved oxygen mg/l 5.0 as a daily minimum
10 This dissolved oxygen standard may be modified on a
11 site-specific basis according to subpart 8, except that no
12 site-specific standard shall be less than 5 mg/l as a daily
13 average and 4 mg/l as a daily minimum. Compliance with
14 this standard is required 50 percent of the days at which
15 the flow of the receiving water is equal to the lowest
16 weekly flow with a once in ten-year recurrence interval
17 (7Q10). This standard applies to all Class 2B waters
18 except for those portions of the Mississippi River from the
19 outlet of the metro wastewater treatment works in Saint
20 Paul (River Mile 835) to Lock and Dam No. 2 at Hastings
21 (River Mile 815). For this reach of the Mississippi River
22 the standard is not less than 5 mg/l as a daily average
23 from April 1 through November 30, and not less than 4 mg/l
24 at other times.

25	Endosulfan	µg/l	0.031	HH	0.28	0.56	Tox.
26	Endrin	µg/l	0.016	HH	0.090	0.18	Tox.
27	Ethylbenzene	µg/l	68	Tox.	1859	3717	Tox.

28
29 Fecal coliform Not to exceed 200 organisms per 100
30 organisms milliliters as a geometric mean of
31 not less than five samples in any
32 calendar month, nor shall more than ten
33 percent of all samples taken during any
34 calendar month individually exceed
35 2,000 organisms per 100 milliliters.
36 The standard applies only between
37 April 1 and October 31.
38

39	Fluoranthene	µg/l	1.9	Tox.	3.5	6.9	Tox.
40							
41	Heptachlor (c)	ng/l	0.39	HH	260*	520*	Tox.
42	Heptachlor	ng/l	0.48	HH	270*	530*	Tox.
43	epoxide (c)						
44	Hexachloro-	ng/l	0.24	HH	None*	None*	Tox.
45	benzene (c)						

46							
47	Lead, total	µg/l	Formula	Tox.	Formula	Formula	Tox.
48	Lead, total						

49 The CS shall not exceed: $\exp.(1.273[\ln(\text{total hardness}$
50 $\text{mg/l})]-4.705)$

51 The MS shall not exceed: $\exp.(1.273[\ln(\text{total hardness}$

1 mg/l)]-1.460)

2 The FAV shall not exceed: $\exp.(1.273[\ln(\text{total hardness}$
3 $\text{mg/l})]-0.7643)$

4 For hardness values greater than 400 mg/l, 400 mg/l shall
5 be used to calculate the standard.

6 Lead standards in $\mu\text{g/l}$ for three hardness values:

Hardness (mg/l)		50	100	200		
Standard: CS		1.3	3.2	7.7		
MS		34	82	197		
FAV		68	164	396		
Lindane (c)	$\mu\text{g/l}$	0.036	HH	4.4*	8.8*	Tox.
(Hexachlorocyclohexane, gamma-)						
Mercury, total	$\mu\text{g/l}$	0.0069	HH	2.4*	4.9*	Tox.
Methylene chloride (c)	$\mu\text{g/l}$	1940	HH	13,875	27,749	Tox.
(Dichloromethane)						
Naphthalene	$\mu\text{g/l}$	81	Tox.	409	818	Tox.
Nickel, total	$\mu\text{g/l}$	Formula	Tox	Formula	Formula	Tox.
Nickel, total						

26 The CS shall not exceed: $\exp.(0.846[\ln(\text{total hardness}$
27 $\text{mg/l})]+1.1645)$

28 The MS shall not exceed: $\exp.(0.846[\ln(\text{total hardness}$
29 $\text{mg/l})]+3.3612)$

30 The FAV shall not exceed: $\exp.(0.846[\ln(\text{total hardness}$
31 $\text{mg/l})]+4.0543)$

32 For hardness values greater than 400 mg/l, 400 mg/l shall
33 be used to calculate the standard.

34 Nickel standards in $\mu\text{g/l}$ for three hardness values:

Hardness (mg/l)		50	100	200		
Standard: CS		88	158	283		
MS		789	1418	2549		
FAV		1578	2836	5098		
Oil	$\mu\text{g/l}$	500	NA	5000	10,000	NA
Parathion	$\mu\text{g/l}$	0.013	Tox.	0.07	0.13	Tox.

1	Standard: CS	1.0	1.0	1.0
2	MS	1.0	2.0	6.7
3	FAV	1.2	4.1	13

4
5 Temperature 5°F above natural in streams and 3°F
6 above natural in lakes, based on monthly
7 average of the maximum daily temperature,
8 except in no case shall it exceed the daily
9 average temperature of 86°F

10							
11	1,1,2,2	µg/l	13	HH	1127	2253	Tox.
12	-Tetrachloroethane						
13	(c)						
14	Tetrachloroethylene	µg/l	8.9	HH	428	857	Tox.
15	(c)						
16	Thallium	µg/l	0.56	HH	64	128	Tox.
17	Toluene	µg/l	253	Tox.	1352	2703	Tox.
18	Toxaphene (c)	ng/l	1.3	HH	730*	1500*	Tox.
19	1,1,1	µg/l	329	Tox.	2957	5913	Tox.
20	-Trichloroethane						
21	1,1,2	µg/l	120	HH	6988	13,976	Tox.
22	-Trichloroethylene						
23	(c)						
24	2,4,6	µg/l	2.0	HH	102	203	Tox.
25	-Trichlorophenol						
26	Turbidity value	NTU	25	NA	None	None	NA
27							
28	Vinyl chloride (c)	µg/l	9.2	HH	None*	None*	NA
29							
30	Xylene, total m,p,o	µg/l	166	Tox.	1407	2814	Tox.
31							
32	Zinc, total	µg/l	Formula	Tox.	Formula	Formula	Tox.
33	Zinc, total						

34 The CS shall not exceed: $\exp.(0.8473[\ln(\text{total hardness}$
35 $\text{mg/l})]+0.7615)$

36 The MS shall not exceed: $\exp.(0.8473[\ln(\text{total hardness}$
37 $\text{mg/l})]+0.8604)$

38 The FAV shall not exceed: $\exp.(0.8473[\ln(\text{total hardness}$
39 $\text{mg/l})]+1.5536)$

40 For hardness values greater than 400 mg/l, 400 mg/l shall
41 be used to calculate the standard.

42 Zinc standards in µg/l for three hardness values:

43	Hardness (mg/l)	50	100	200
44				
45				
46	Standard: CS	59	106	191
47	MS	65	117	211
48	FAV	130	234	421

1 [For text of subps 5 and 6, see M.R.]

2 Subp. 7. **Additional standards.** The following additional
3 standards and requirements apply to all Class 2 waters.

4 A. No sewage, industrial waste, or other wastes from
5 point or nonpoint sources shall be discharged into any of the
6 waters of this category so as to cause any material change in
7 any other substances or characteristics which may impair the
8 quality of the waters of the state or the aquatic biota of any
9 of the classes in subparts 2 to 6 or in any manner render them
10 unsuitable or objectionable for fishing, fish culture, or
11 recreational uses. Additional selective limits or changes in
12 the discharge bases may be imposed on the basis of local needs.

13 [For text of items B to E, see M.R.]

14 [For text of subps 8 and 9, see M.R.]

15 7050.0470 CLASSIFICATIONS FOR WATERS IN MAJOR SURFACE WATER
16 DRAINAGE BASINS.

17 Subpart 1. **Lake Superior Basin.** The water use
18 classifications for the listed waters in the Lake Superior Basin
19 are as identified in items A, B, and D.

20 [For text of item A, see M.R.]

21 B. Lakes:

22 [For text of subitems (1) to (127), see M.R.]

23 (128) *Superior, Lake, excluding the portions
24 identified in subitem (129) [11/5/84R] (T.49, 50, 51, 52, 53,
25 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, R.14W-7E): 1B, 2A,
26 3A;

27 [For text of subitems (129) to (153), see M.R.]

10/09/02

[REVISOR] CMR/DI AR3321

1 [For text of items C and D, see M.R.]

2 [For text of subps 2 to 9, see M.R.]