

1 Department of Health

2

3 Adopted Permanent Rules Relating to Health Risk Limits

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5 Rules as Adopted

6 4717.7100 PURPOSE.

7 Parts 4717.7100 to 4717.7800 establish the factors and  
8 methods used to calculate health risk limits and use those  
9 factors and methods to calculate the health risk limit numbers  
10 for substances found to degrade Minnesota groundwater.  
11 Minnesota Statutes, section 103H.201, indicates that health risk  
12 limits be calculated as human health-based groundwater standards.

13 4717.7150 DEFINITIONS.

14 Subpart 1. **Scope.** For the purposes of parts 4717.7100 to  
15 4717.7800, the terms in this part have the meanings given them.

16 Subp. 2. **Carcinogen.** "Carcinogen" means a substance or  
17 chemical listed by the United States Environmental Protection  
18 Agency as a human carcinogen or a probable human carcinogen  
19 according to the "EPA Classification System for Categorizing  
20 Weight of Evidence for Carcinogenicity from Human and Animal  
21 Studies" contained in The Risk Assessment Guidelines of 1986,  
22 published by the United States Environmental Protection Agency  
23 August 1987 by the Office of Health and Environmental  
24 Assessment, Washington, D.C. A carcinogen does not include a  
25 possible human carcinogen.

26 Subp. 3. **Chemical abstract service registry number or CAS**  
27 **RN.** "Chemical abstract service registry number" or "CAS RN"  
28 means the chemical abstract service registry number assigned to  
29 a chemical by the Chemical Abstracts Service, a division of the  
30 American Chemical Society, 2540 Olentangy River Road, Box 3012,  
31 Columbus, Ohio 43210. The chemical abstract service registry  
32 numbers are incorporated by reference. CAS RNs are published by  
33 the Chemical Abstracts Service in the Registry Handbook-Common  
34 Names, which is available through the Minitex interlibrary loan  
35 system and is updated annually.

1 Subp. 4. Health risk limit or HRL. "Health risk limit" or  
2 "HRL" has the meaning given in Minnesota Statutes, section  
3 103H.005, subdivision 3.

4 Subp. 5. Integrated Risk Information System or IRIS.  
5 "Integrated Risk Information System" or "IRIS" means the United  
6 States Environmental Protection Agency's electronic data base  
7 for toxicologic information on chemicals. IRIS is available  
8 through the Minnesota Department of Health and is updated  
9 monthly.

10 Subp. 6. Possible human carcinogen. "Possible human  
11 carcinogen" means a substance or chemical listed by the United  
12 States Environmental Protection Agency as a possible human  
13 carcinogen according to the "EPA Classification System for  
14 Categorizing Weight of Evidence for Carcinogenicity from Human  
15 and Animal Studies" contained in The Risk Assessment Guidelines  
16 of 1986, published by the United States Environmental Protection  
17 Agency August 1987 by the Office of Health and Environmental  
18 Assessment, Washington, D.C.

19 Subp. 7. Reference dose or RfD. "Reference dose" or "RfD"  
20 means the toxic potency of a systemic toxicant listed on IRIS as  
21 the reference dose or RfD. The RfD is expressed in units of  
22 milligrams of the substance or chemical per kilogram of body  
23 weight per day.

24 Subp. 8. Relative source contribution or RSC. "Relative  
25 source contribution" or "RSC" means the percent of total  
26 exposure to a substance or chemical, including air and food,  
27 that comes from ingesting water listed as the relative source  
28 contribution or RSC by the United States Environmental  
29 Protection Agency, and specified in part 4717.7200, subpart 2,  
30 items C and D.

31 Subp. 9. Slope factor or potency slope. "Slope factor" or  
32 "potency slope" means the carcinogenic potency listed on IRIS as  
33 the slope factor or potency slope. It is expressed in units of  
34 the inverse of milligrams of the substance or chemical per  
35 kilogram of body weight per day.

36 Subp. 10. Systemic toxicant. "Systemic toxicant" means a

1 substance or chemical not defined in this part as a carcinogen.  
2 Systemic toxicants include possible human carcinogens.

3 Subp. 11. Uncertainty factor or UF. "Uncertainty factor"  
4 or "UF" means the numerical factor listed by the United States  
5 Environmental Protection Agency, and specified in part  
6 4717.7200, subpart 4, items B and C, that is incorporated into  
7 the equation specified in part 4717.7200, subpart 4, to account  
8 for the possible carcinogenic effects of a substance or chemical.

9 4717.7200 HEALTH RISK LIMITS FOR SYSTEMIC TOXICANTS.

10 Subpart 1. Scope. This part establishes the method for  
11 determining the health risk limit for a systemic toxicant.

12 Subp. 2. Equation for systemic toxicants other than  
13 nitrate (as nitrogen) or possible human carcinogens. The  
14 equation for determining the health risk limit for a systemic  
15 toxicant other than nitrate (as nitrogen) or a possible human  
16 carcinogen is:

17 
$$\text{HRL} = \frac{(\text{RfD})(70)(\text{RSC})(1,000)}{(2)}$$
  
18  
19  
20

21 Where:

22 A. HRL is expressed in microgram or micrograms per  
23 liter.

24 B. (70) is the standard weight of an adult expressed  
25 in kilograms.

26 C. The RSC for substances or chemicals not listed in  
27 item D shall be 0.2.

28 D. The RSC for the following substances or chemicals  
29 is:

30	Name	CAS RN	RSC
31			
32	(1) antimony	7440-36-0	0.4
33	(2) barium	7440-39-3	0.8
34	(3) cadmium	7440-43-9	0.25
35	(4) chromium VI	18540-29-9	0.7
36	(5) manganese	7439-96-5	0.8

37  
38 E. (1,000) is a factor used to convert the units of  
39 concentration from milligrams per liter to micrograms per  
40 liter. There are 1,000 micrograms per milligram.

41 F. (2) is the standard amount of water ingested by an



1 liter.

2 B. ( $10^{-5}$ ) is the lifetime risk level such that no  
 3 more than one out of every 100,000 people exposed to a substance  
 4 or chemical over a lifetime would be estimated to develop cancer  
 5 from that exposure.

6 C. (70) is the standard weight of an adult expressed  
 7 in kilograms.

8 D. (1,000) is a factor used to convert the units of  
 9 concentration from milligrams per liter to micrograms per  
 10 liter. There are 1,000 micrograms per milligram.

11 E. (2) is the standard amount of water ingested by an  
 12 adult expressed in terms of liters per day.

13 4717.7400 HEALTH RISK LIMITS.

14 The table of health risk limits in part 4717.7500 lists the  
 15 health risk limits derived from the methods specified in parts  
 16 4717.7200 and 4717.7300. For each substance or chemical listed  
 17 in the table of health risk limits in part 4717.7500, the table  
 18 shall specify the:

- 19 A. chemical or substance name;
- 20 B. CAS RN;
- 21 C. reference dose for a systemic toxicant or slope  
 22 factor for a carcinogen; and
- 23 D. health risk limit.

24 4717.7500 TABLE OF HEALTH RISK LIMITS.

25 Subpart 1. Generally. This part contains the table of the  
 26 health risk limits. For each substance or chemical listed in a  
 27 subpart, the information required by part 4717.7400 shall be  
 28 specified in the manner required by this subpart.

29 CAS RN	RfD*, ++ 30 (milligrams 31 per kilogram 32 per day)	Slope 33 factor++ 34 (the inverse 35 of milligrams 36 per kilogram per day)	Health 37 Risk 38 Limit 39 (micrograms per liter)
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36 Subp. 2. Acenaphthene. Acenaphthene:

37 83-32-9	0.06	--	400
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39 Subp. 3. Acetone. Acetone:

1	67-64-1	0.1	--	700
2				
3	Subp. 4.	Aldicarb.	Aldicarb:	
4	116-06-3	0.0002	--	1
5				
6	Subp. 5.	Anthracene.	Anthracene:	
7	120-12-7	0.3	--	2,000
8				
9	Subp. 6.	Antimony.	Antimony:	
10	7440-36-0	0.0004	--	6
11				
12	Subp. 6a.	Atrazine.	Atrazine:	
13	<u>1912-24-9</u>	<u>0.035 (C)</u>	<u>--</u>	<u>20</u>
14				
15	Subp. 7.	Barium.	Barium:	
16	7440-39-3	0.07	--	2,000
17				
18	Subp. 8.	Benzene.	Benzene:	
19	71-43-2	--	0.029	10
20				
21	Subp. 9.	Benzoic acid.	Benzoic acid:	
22	65-85-0	4	--	30,000
23				
24	Subp. 10.	Beryllium.	Beryllium:	
25	7440-41-7	--	4.3	0.08
26				
27	Subp. 11.	1,1-Biphenyl (Diphenyl).	1,1-Biphenyl	
28	(Diphenyl):			
29	92-52-4	0.05	--	300
30				
31	Subp. 12.	Bis(chloroethyl)ether (BCEE).		
32	Bis(chloroethyl)ether (BCEE):			
33	111-44-4	--	1.1	0.3
34				
35	Subp. 13.	Bis(chloromethyl)ether (BCME).		
36	Bis(chloromethyl)ether (BCME):			
37	542-88-1	--	220	0.002
38				
39	Subp. 14.	Boron.	Boron:	
40	7440-42-8	0.09	--	600
41				
42	Subp. 15.	Bromodichloromethane.	Bromodichloromethane:	
43	75-27-4	--	0.062	6
44				
45	Subp. 16.	Bromoform.	Bromoform:	
46	75-25-2	--	0.0079	40
47				
48	Subp. 17.	Bromomethane (Methyl bromide).	Bromomethane	
49	(Methyl bromide):			
50	74-83-9	0.0014	--	10
51				
52	Subp. 18.	n-Butanol.	n-Butanol:	

1	71-36-3	0.1	--	700
2				
3	Subp. 19. Butyl benzyl phthalate. Butyl benzyl phthalate:			
4	85-68-7	0.2 (C)	--	100
5				
6	Subp. 20. Butylphthalyl butylglycolate (BPBG).			
7	Butylphthalyl butylglycolate (BPBG):			
8	85-70-1	1	--	7,000
9				
10	Subp. 21. Cadmium. Cadmium:			
11	7440-43-9	0.0005	--	4
12				
13	Subp. 22. Carbon disulfide. Carbon disulfide:			
14	75-15-0	0.1	--	700
15				
16	Subp. 23. Carbon tetrachloride. Carbon tetrachloride:			
17	56-23-5	--	0.13	3
18				
19	Subp. 24. Chlorobenzene. Chlorobenzene:			
20	108-90-7	0.02	--	100
21				
22	Subp. 25. Chloroform. Chloroform:			
23	67-66-3	--	0.0061	60
24				
25	Subp. 26. 2-Chlorophenol. 2-Chlorophenol:			
26	95-57-8	0.005	--	30
27				
28	Subp. 27. Chromium VI. Chromium VI:			
29	18540-29-9	0.005	--	100
30				
31	Subp. 28. Cumene (Isopropyl benzene). Cumene (Isopropyl			
32	benzene):			
33	98-82-8	0.04	--	300
34				
35	Subp. 29. Cyanide, free. Cyanide, free:			
36	57-12-5	0.02	--	100
37				
38	Subp. 30. Dibromochloromethane. Dibromochloromethane:			
39	124-48-1	0.02 (C)	--	10
40				
41	Subp. 31. 1,2-Dibromoethane (Ethylene dibromide, EDB).			
42	1,2-Dibromoethane (Ethylene dibromide, EDB):			
43	106-93-4	--	85	0.004
44				
45	Subp. 32. Dibutyl phthalate. Dibutyl phthalate:			
46	84-74-2	0.1	--	700
47				
48	Subp. 33. Dicamba. Dicamba:			
49	1918-00-9	0.03	--	200
50				
51	Subp. 34. 1,2-Dichlorobenzene. 1,2-Dichlorobenzene:			
52	95-50-1	0.09	--	600

1  
2 Subp. 35. 3,3'-Dichlorobenzidine. 3,3'-Dichlorobenzidine:  
3 91-94-1 -- 0.45 0.8  
4  
5 Subp. 36. Dichlorodifluoromethane.  
6 Dichlorodifluoromethane:  
7 75-71-8 0.2 -- 1,000  
8  
9 Subp. 37. p,p'-Dichlorodiphenyl dichloroethane (DDD).  
10 p,p'-Dichlorodiphenyl dichloroethane (DDD):  
11 72-54-8 -- 0.24 1  
12  
13 Subp. 38. p,p'-Dichlorodiphenyldichloroethylene (DDE).  
14 p,p'-Dichlorodiphenyldichloroethylene (DDE):  
15 72-55-9 -- 0.34 1  
16  
17 Subp. 39. p,p'-Dichlorodiphenyltrichloroethane (DDT).  
18 p,p'-Dichlorodiphenyltrichloroethane (DDT):  
19 50-29-3 -- 0.34 1  
20  
21 Subp. 40. 1,2-Dichloroethane. 1,2-Dichloroethane:  
22 107-06-2 -- 0.091 4  
23  
24 Subp. 41. 1,1-Dichloroethylene (Vinylidene chloride).  
25 1,1-Dichloroethylene (Vinylidene chloride):  
26 75-35-4 0.009 (C) -- 6  
27  
28 Subp. 42. 1,2-Dichloroethylene, trans-.  
29 1,2-Dichloroethylene, trans-:  
30 156-60-5 0.02 -- 100  
31  
32 Subp. 43. Dichloromethane (Methylene chloride).  
33 Dichloromethane (Methylene chloride):  
34 75-09-2 -- 0.0075 50  
35  
36 Subp. 44. 2,4-Dichlorophenol. 2,4-Dichlorophenol:  
37 120-83-2 0.003 -- 20  
38  
39 Subp. 45. 2,4-Dichlorophenoxyacetic acid (2,4-D).  
40 2,4-Dichlorophenoxyacetic acid (2,4-D):  
41 94-75-7 0.01 -- 70  
42  
43 Subp. 46. Di(2-ethylhexyl)phthalate (DEHP).  
44 Di(2-ethylhexyl)phthalate (DEHP):  
45 117-81-7 -- 0.014 20  
46  
47 Subp. 47. Diethyl phthalate. Diethyl phthalate:  
48 84-66-2 0.8 -- 6,000  
49



1 Subp. 48. 2,4-Dimethylphenol. 2,4-Dimethylphenol:  
2 105-67-9 0.02 -- 100  
3  
4 Subp. 49. 2,4-Dinitrophenol. 2,4-Dinitrophenol:  
5 51-28-5 0.002 -- 10  
6  
7 Subp. 50. Ethylbenzene. Ethylbenzene:  
8 100-41-4 0.1 -- 700  
9  
10 Subp. 51. S-Ethyl dipropylthiocarbamate (EPTC). S-Ethyl  
11 dipropylthiocarbamate (EPTC):  
12 759-94-4 0.025 -- 200  
13  
14 Subp. 52. Ethyl ether. Ethyl ether:  
15 60-29-7 0.2 -- 1,000  
16  
17 Subp. 53. Fluoranthene. Fluoranthene:  
18 206-44-0 0.04 -- 300  
19  
20 Subp. 54. Fluorene (9H-Fluorene). Fluorene (9H-Fluorene):  
21 86-73-7 0.04 -- 300  
22  
23 Subp. 55. Heptachlor. Heptachlor:  
24 76-44-8 -- 4.5 0.08  
25  
26 Subp. 56. Heptachlor epoxide. Heptachlor epoxide:  
27 1024-57-3 -- 9.1 0.04  
28  
29 Subp. 57. Hexachlorobenzene. Hexachlorobenzene:  
30 118-74-1 -- 1.6 0.2  
31  
32 Subp. 58. Hexachlorobutadiene. Hexachlorobutadiene:  
33 87-68-3 0.002 (C) -- 1  
34  
35 Subp. 59. Isophorone. Isophorone:  
36 78-59-1 0.2 (C) -- 100  
37  
38 Subp. 60. Linuron. Linuron:  
39 330-55-2 0.002 (C) -- 1  
40  
41 Subp. 61. Manganese. Manganese:  
42 7439-96-5 0.005 -- 100  
43  
44 Subp. 62. 2-Methyl-4-chlorophenoxyacetic acid (MCPA).  
45 2-Methyl-4-chlorophenoxyacetic acid (MCPA):  
46 94-74-6 0.0005 -- 3  
47  
48 Subp. 63. 2-Methylphenol (o-cresol). 2-Methylphenol  
49 (o-cresol):  
50 95-48-7 0.05 (C) -- 30  
51  
52 Subp. 64. 3-Methylphenol (m-cresol). 3-Methylphenol

1 (m-cresol):

2 108-39-4 0.05 (C) -- 30

3

4 Subp. 65. Metolachlor. Metolachlor:

5 51218-45-2 0.15 (C) -- 100

6

7 Subp. 66. Metribuzin. Metribuzin:

8 21087-64-9 0.025 -- 200

9

10 Subp. 67. Nickel, soluble salts. Nickel, soluble salts:

11 7440-02-0 0.02 -- 100

12

13 Subp. 68. Nitrate (as nitrogen). Nitrate (as nitrogen):

14 14797-55-8 1.6 -- 10,000

15

16 Subp. 69. N-Nitrosodiphenylamine. N-Nitrosodiphenylamine:

17 86-30-6 -- 0.0049 70

18

19 Subp. 70. Pentachlorophenol. Pentachlorophenol:

20 87-86-5 -- 0.12 3

21

22 Subp. 71. Phenol. Phenol:

23 108-95-2 0.6 -- 4,000

24

25 Subp. 72. Picloram. Picloram:

26 1918-02-1 0.07 -- 500

27

28 Subp. 73. Prometon. Prometon:

29 1610-18-0 0.015 -- 100

30

31 Subp. 74. Propachlor. Propachlor:

32 1918-16-7 0.013 -- 90

33

34 Subp. 75. Pyrene. Pyrene:

35 129-00-0 0.03 -- 200

36

37 Subp. 76. Selenium. Selenium:

38 7782-49-2 0.005 -- 30

39

40 Subp. 77. Silver. Silver:

41 7440-22-4 0.005 -- 30

42

43 Subp. 78. 1,1,1,2-Tetrachloroethane.

44 1,1,1,2-Tetrachloroethane:

45 630-20-6 0.03 (C) -- 70

46

47 Subp. 79. Toluene. Toluene:

48 108-88-3 0.2 -- 1,000

49

50 Subp. 80. Toxaphene. Toxaphene:

51 8001-35-2 -- 1.1 0.3

52

53 Subp. 81. 1,1,2-Trichloroethane. 1,1,2-Trichloroethane:

1 79-00-5 0.004 (C) -- 3  
2  
3 Subp. 82. Trichlorofluoromethane. Trichlorofluoromethane:  
4 75-69-4 0.3 -- 2,000  
5  
6 Subp. 83. 2,4,6-Trichlorophenol. 2,4,6-Trichlorophenol:  
7 88-06-2 -- 0.011 30  
8  
9 Subp. 84. 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T).  
10 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T):  
11 93-76-5 0.01 -- 70  
12  
13 Subp. 85. 2 (2,4,5-Trichlorophenoxy) propionic acid. 2  
14 (2,4,5-Trichlorophenoxy) propionic acid:  
15 93-72-1 0.008 -- 60  
16  
17 Subp. 86. 1,2,3-Trichloropropane. 1,2,3-Trichloropropane:  
18 96-18-4 0.006 -- 40  
19  
20 Subp. 87. 1,1,2-Trichloro-1,2,2-trifluoroethane.  
21 1,1,2-Trichloro-1,2,2-trifluoroethane:  
22 76-13-1 30 -- 200,000  
23  
24 Subp. 88. 1,3,5-Trinitrobenzene. 1,3,5-Trinitrobenzene:  
25 99-35-4 0.00005 -- 0.3  
26  
27 Subp. 89. Xylenes (mixture of isomers o, m, p). Xylenes  
28 (mixture of isomers o, m, p):  
29 1330-20-7 2 -- 10,000  
30  
31 Subp. 90. Reference doses and slope factors. For purposes  
32 of this part:  
33 \* Substances or chemicals that have a RfD annotated with a  
34 (C) are classified by the United States Environmental Protection  
35 Agency as possible human carcinogens; and  
36 ++ The reference doses and slope factors are current as of  
37 February 1993.

38 4717.7600 HEALTH RISK LIMITS FOR MIXTURES.  
39 Subpart 1. Definitions. For the purposes of parts  
40 4717.7600 to 4717.7800, the terms in this part have the meanings  
41 given them.  
42 Subp. 2. Groundwater. "Groundwater" has the meaning given  
43 in Minnesota Statutes, section 115.01, subdivision 21.  
44 Subp. 3. Mixture. "Mixture" means groundwater in which

1 two or more substances or chemicals, for which a health risk  
2 limit is specified in part 4717.7500, are detected.

3 Subp. 4. Toxic endpoint. "Toxic endpoint" means:

4 A. the organ or physiological system affected by  
5 exposure to a substance or chemical, where the physiological  
6 effect is listed in the study or studies used by the United  
7 States Environmental Protection Agency to calculate a reference  
8 dose specified in part 4717.7500; or

9 B. cancer for a chemical or substance that is  
10 identified as a carcinogen.

11 Toxic endpoints include, but are not limited to, cancer,  
12 cardiovascular system, developmental effects, endocrine system,  
13 eyes, hematologic system, immune system, kidney, liver, male  
14 reproductive system, nervous system, and stomach.

15 4717.7650 TOXIC ENDPOINTS.

16 Subpart 1. Scope. The toxic endpoints specified for each  
17 substance or chemical for which a health risk limit is specified  
18 in part 4717.7500 are listed in this part. Each subpart  
19 contains the chemical name, the CAS RN, and the toxic endpoint  
20 or endpoints.

21 Subp. 2. Acenaphthene. Acenaphthene, 83-32-9, liver.

22 Subp. 3. Acetone. Acetone, 67-64-1, kidney.

23 Subp. 4. Aldicarb. Aldicarb, 116-06-3, nervous system.

24 Subp. 4a. Atrazine. Atrazine, 1912-24-9, cardiovascular  
25 system.

26 Subp. 5. Barium. Barium, 7440-39-3, cardiovascular system.

27 Subp. 6. Benzene. Benzene, 71-43-2, cancer.

28 Subp. 7. Beryllium. Beryllium, 7440-41-7, cancer.

29 Subp. 8. 1,1-Biphenyl (Diphenyl). 1,1-Biphenyl  
30 (Diphenyl), 92-52-4, kidney.

31 Subp. 9. Bis(chloroethyl)ether (BCEE).

32 Bis(chloroethyl)ether (BCEE), 111-44-4, cancer.

33 Subp. 10. Bis(chloromethyl)ether (BCME).

34 Bis(chloromethyl)ether (BCME), 542-88-1, cancer.

35 Subp. 11. Boron. Boron, 7440-42-8, male reproductive

- 1 system.
- 2 Subp. 12. Bromodichloromethane. Bromodichloromethane,  
3 75-27-4, cancer.
- 4 Subp. 13. Bromoform. Bromoform, 75-25-2, cancer.
- 5 Subp. 14. Bromomethane (Methyl bromide). Bromomethane  
6 (Methyl bromide), 74-83-9, stomach.
- 7 Subp. 15. n-Butanol. n-Butanol, 71-36-3, nervous system.
- 8 Subp. 16. Cadmium. Cadmium, 7440-43-9, kidney.
- 9 Subp. 17. Carbon disulfide. Carbon disulfide, 75-15-0,  
10 developmental effects.
- 11 Subp. 18. Carbon tetrachloride. Carbon tetrachloride,  
12 56-23-5, cancer.
- 13 Subp. 19. Chlorobenzene. Chlorobenzene, 108-90-7, liver.
- 14 Subp. 20. Chloroform. Chloroform, 67-66-3, cancer.
- 15 Subp. 21. 2-Chlorophenol. 2-Chlorophenol, 95-57-8,  
16 developmental effects.
- 17 Subp. 22. Cyanide, free. Cyanide, free, 57-12-5,  
18 endocrine system, nervous system.
- 19 Subp. 23. Dibromochloromethane. Dibromochloromethane,  
20 124-48-1, liver.
- 21 Subp. 24. 1,2-Dibromoethane (Ethylene dibromide, EDB).  
22 1,2-Dibromoethane (Ethylene dibromide, EDB), 106-93-4, cancer.
- 23 Subp. 25. Dicamba. Dicamba, 1918-00-9, developmental  
24 effects.
- 25 Subp. 26. 1,2-Dichlorobenzene. 1,2-Dichlorobenzene,  
26 95-50-1, liver.
- 27 Subp. 27. 3,3'-Dichlorobenzidine. 3,3'-Dichlorobenzidine,  
28 91-94-1, cancer.
- 29 Subp. 28. p,p'-Dichlorodiphenyl dichloroethane (DDD).  
30 p,p'-Dichlorodiphenyl dichloroethane (DDD), 72-54-8, cancer.
- 31 Subp. 29. p,p'-Dichlorodiphenyldichloroethylene (DDE).  
32 p,p'-Dichlorodiphenyldichloroethylene (DDE), 72-55-9, cancer.
- 33 Subp. 30. p,p'-Dichlorodiphenyltrichloroethane (DDT).  
34 p,p'-Dichlorodiphenyltrichloroethane (DDT), 50-29-3, cancer.
- 35 Subp. 31. 1,2-Dichloroethane. 1,2-Dichloroethane,  
36 107-06-2, cancer.

- 1 Subp. 32. 1,1-Dichloroethylene (Vinylidene chloride).  
2 1,1-Dichloroethylene (Vinylidene chloride), 75-35-4, liver.
- 3 Subp. 33. Dichloromethane (Methylene chloride).  
4 Dichloromethane (Methylene chloride), 75-09-2, cancer.
- 5 Subp. 34. 2,4-Dichlorophenol. 2,4-Dichlorophenol,  
6 120-83-2, immune system.
- 7 Subp. 35. 2,4-Dichlorophenoxyacetic acid (2,4-D).  
8 2,4-Dichlorophenoxyacetic acid (2,4-D), 94-75-7, hematologic  
9 system, kidney, liver.
- 10 Subp. 36. Di(2-ethylhexyl)phthalate (DEHP).  
11 Di(2-ethylhexyl)phthalate (DEHP), 117-81-7, cancer.
- 12 Subp. 37. 2,4-Dimethylphenol. 2,4-Dimethylphenol,  
13 105-67-9, hematologic system, nervous system.
- 14 Subp. 38. 2,4-Dinitrophenol. 2,4-Dinitrophenol, 51-28-5,  
15 eyes.
- 16 Subp. 39. Ethylbenzene. Ethylbenzene, 100-41-4, kidney,  
17 liver.
- 18 Subp. 40. S-Ethyl dipropylthiocarbamate (EPTC). S-Ethyl  
19 dipropylthiocarbamate (EPTC), 759-94-4, cardiovascular system,  
20 nervous system.
- 21 Subp. 41. Fluoranthene. Fluoranthene, 206-44-0, kidney,  
22 liver.
- 23 Subp. 42. Fluorene (9H-Fluorene). Fluorene (9H-Fluorene),  
24 86-73-7, hematologic system.
- 25 Subp. 43. Heptachlor. Heptachlor, 76-44-8, cancer.
- 26 Subp. 44. Heptachlor epoxide. Heptachlor epoxide,  
27 1024-57-3, cancer.
- 28 Subp. 45. Hexachlorobenzene. Hexachlorobenzene, 118-74-1,  
29 cancer.
- 30 Subp. 46. Hexachlorobutadiene. Hexachlorobutadiene,  
31 87-68-3, kidney.
- 32 Subp. 47. Isophorone. Isophorone, 78-59-1, kidney.
- 33 Subp. 48. Linuron. Linuron, 330-55-2, hematologic system.
- 34 Subp. 49. Manganese. Manganese, 7439-96-5, nervous system.
- 35 Subp. 50. 2-Methyl-4-chlorophenoxyacetic acid (MCPA).  
36 2-Methyl-4-chlorophenoxyacetic acid (MCPA), 94-74-6, kidney,

1 liver.

2 Subp. 51. **2-Methylphenol, (o-cresol).** 2-Methylphenol,  
3 (o-cresol), 95-48-7, nervous system.

4 Subp. 52. **3-Methylphenol, (m-cresol).** 3-Methylphenol,  
5 (m-cresol), 108-39-4, nervous system.

6 Subp. 53. **Metolachlor.** Metolachlor, 51218-45-2,  
7 developmental effects.

8 Subp. 54. **Metribuzin.** Metribuzin, 21087-64-9, kidney,  
9 liver.

10 Subp. 55. **Nitrate (as nitrogen).** Nitrate (as nitrogen),  
11 14797-55-8, hematologic system.

12 Subp. 56. **N-Nitrosodiphenylamine.** N-Nitrosodiphenylamine,  
13 86-30-6, cancer.

14 Subp. 57. **Pentachlorophenol.** Pentachlorophenol, 87-86-5,  
15 cancer.

16 Subp. 58. **Phenol.** Phenol, 108-95-2, developmental effects.

17 Subp. 59. **Picloram.** Picloram, 1918-02-1, liver.

18 Subp. 60. **Pyrene.** Pyrene, 129-00-0, kidney.

19 Subp. 61. **1,1,1,2-Tetrachloroethane.**

20 1,1,1,2-Tetrachloroethane, 630-20-6, kidney, liver.

21 Subp. 62. **Toluene.** Toluene, 108-88-3, kidney, liver.

22 Subp. 63. **Toxaphene.** Toxaphene, 8001-35-2, cancer.

23 Subp. 64. **1,1,2-Trichloroethane.** 1,1,2-Trichloroethane,  
24 79-00-5, immune system.

25 Subp. 65. **2,4,6-Trichlorophenol.** 2,4,6-Trichlorophenol,  
26 88-06-2, cancer.

27 Subp. 66. **2,4,5-Trichlorophenoxyacetic acid (2,4,5-T).**  
28 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), 93-76-5,  
29 developmental effects, hematologic system.

30 Subp. 67. **2 (2,4,5-Trichlorophenoxy) propionic acid.** 2  
31 (2,4,5-Trichlorophenoxy) propionic acid, 93-72-1, liver.

32 Subp. 68. **1,2,3-Trichloropropane.** 1,2,3-Trichloropropane,  
33 96-18-4, hematologic system, kidney, liver.

34 Subp. 69. **Xylenes (mixture of isomers o, m, p).** Xylenes  
35 (mixture of isomers o, m, p), 1330-20-7, nervous system.

1 4717.7700 PROCEDURE FOR DETERMINING IF THE HEALTH RISK LIMIT FOR  
2 A MIXTURE OF CARCINOGENS IS EXCEEDED.

3 To determine if the health risk limit for a mixture of  
4 carcinogens is exceeded, a hazard index must be calculated using  
5 the procedure in this part.

6 A. A hazard index shall be determined for substances  
7 or chemicals with a toxic endpoint of cancer as specified in  
8 part 4717.7650 using the following equation:

$$\begin{array}{l} 9 \quad \text{Hazard index} = \frac{E_{C1}}{\text{HRL}_{C1}} + \frac{E_{C2}}{\text{HRL}_{C2}} + \dots + \frac{E_{Cn}}{\text{HRL}_{Cn}} \\ 10 \\ 11 \\ 12 \end{array}$$

13 Where:

14 (1)  $E_{Cn}$  represents the concentration of the  
15 first, second, ..., nth carcinogen detected in groundwater; and

16 (2)  $\text{HRL}_{Cn}$  represents the health risk limit of the  
17 first, second, ..., nth carcinogen as specified in part  
18 4717.7500.

19 B. A hazard index of one indicates a lifetime risk  
20 level of one in 100,000.

21 C. A hazard index of one equals the health risk limit.

22 D. A hazard index greater than one exceeds the health  
23 risk limit.

24 4717.7750 PROCEDURE FOR DETERMINING IF THE HEALTH RISK LIMIT FOR  
25 A MIXTURE OF SYSTEMIC TOXICANTS IS EXCEEDED.

26 To determine if the health risk limit for a mixture of  
27 systemic toxicants is exceeded, a hazard index must be  
28 calculated using the procedure in this part.

29 A. The substances or chemicals detected in the  
30 groundwater must be grouped by toxic endpoint as specified in  
31 part 4717.7650.

32 B. When two or more substances or chemicals have the  
33 same toxic endpoint, a hazard index must be determined for each  
34 group of substances or chemicals with the same toxic endpoint  
35 using the following equation:

$$\begin{array}{l} 36 \quad \text{Hazard index} = \frac{E_{ST1}}{\text{HRL}_{ST1}} + \frac{E_{ST2}}{\text{HRL}_{ST2}} + \dots + \frac{E_{STn}}{\text{HRL}_{STn}} \\ 37 \\ 38 \\ 39 \end{array}$$



1 Where:

2 (1)  $E_{STn}$  represents the concentration of the  
3 first, second, ..., nth systemic toxicant detected in  
4 groundwater; and

5 (2)  $HRL_{STn}$  represents the health risk limit of  
6 the first, second, ..., nth systemic toxicant as specified in  
7 part 4717.7500.

8 C. A hazard index of one equals the health risk limit.

9 D. A hazard index greater than one exceeds the health  
10 risk limit.

11 4717.7800 REVISION OF PARTS 4717.7500 and 4717.7650.

12 Subpart 1. Scope. This part specifies the conditions  
13 under which parts 4717.7500 and 4717.7650 shall be revised.

14 Subp. 2. ~~Removing a health risk limit or toxic endpoint.~~  
15 ~~The department shall remove a health risk limit for a chemical~~  
16 ~~or substance specified in part 4717.7500 or a toxic endpoint~~  
17 ~~specified in part 4717.7650 under the procedures described in~~  
18 ~~subpart 6 if:~~

19 ~~A.--the RfD or slope factor listed in part 4717.7500~~  
20 ~~is removed from IRIS;~~

21 ~~B.--the classification of a substance or chemical~~  
22 ~~changes from carcinogen to systemic toxicant and the RfD for the~~  
23 ~~substance or chemical is not listed on IRIS; or~~

24 ~~C.--the classification of a substance or chemical~~  
25 ~~changes from systemic toxicant to carcinogen and the slope~~  
26 ~~factor for the substance or chemical is not listed on IRIS.~~

27 Subp. 3. Revising a health risk limit or toxic endpoint.  
28 The department shall revise a health risk limit for a chemical  
29 or substance specified in part 4717.7500 or a toxic endpoint  
30 specified in part 4717.7650 under the procedures described in  
31 subpart 6 5 if:

32 A. the RfD or slope factor listed in part 4717.7500  
33 is revised and listed on IRIS;

34 B. the RSC specified in part 4717.7200, subpart 2,  
35 item C or D, is revised and listed by the United States

1 Environmental Protection Agency;

2 C. the UF specified in part 4717.7200, subpart 4,  
3 item B or C, is revised and listed by the United States

4 Environmental Protection Agency;

5 D. the classification of a substance or chemical is  
6 changed from carcinogen to systemic toxicant and the RfD for the  
7 substance or chemical is listed on IRIS;

8 E. the classification of a substance or chemical is  
9 changed from systemic toxicant to carcinogen and the slope  
10 factor for the substance or chemical is listed on IRIS;

11 F. the United States Environmental Protection Agency  
12 reclassifies a systemic toxicant as a possible human carcinogen;  
13 or

14 G. the United States Environmental Protection Agency  
15 reclassifies a substance or chemical so that it is no longer a  
16 possible human carcinogen.

17 Subp. ~~4~~ 3. **Methods.** The revised health risk limit shall  
18 be calculated or the revised toxic endpoint shall be specified  
19 according to the methods in parts 4717.7100 to 4717.7700.

20 Subp. ~~5~~ 4. **Adding a health risk limit or toxic endpoint.**  
21 The commissioner shall add to part 4717.7500 a substance or  
22 chemical, the health risk limit for that substance or chemical,  
23 and the information specified in part 4717.7400 or add to part  
24 4717.7650 a substance or chemical, CAS RN, and toxic endpoint  
25 when a substance or chemical is detected in Minnesota  
26 groundwater and the RfD or slope factor for the substance or  
27 chemical is listed on IRIS. The new health risk limit shall be  
28 calculated or the new toxic endpoint shall be specified  
29 according to the methods in parts 4717.7100 to 4717.7700 and the  
30 procedures described in subpart 6 5.

31 Subp. ~~6~~ 5. **Frequency of revisions.** Revisions made  
32 according to this part shall be published in the State Register  
33 at least annually beginning in January 1994. The revisions  
34 shall be effective 30 days after publication unless the  
35 commissioner receives 25 requests for the department to adopt  
36 the revisions according to the administrative rules procedures

11/01/93

[REVISOR ] MEO/CA AR1868

1 in Minnesota Statutes, sections 14.001 to 14.560.