

- (b) A ridge and furrow system;
- (c) A spray irrigation system,
- (d) An overland flow system,
- (e) A subsurface field absorption system,
- (f) A land spreading system, or
- (g) Any other land area receiving liquid waste discharges.

(12) "Limit of detection" means the lowest concentration for an analytical test method and sample matrix at which the presence of a substance can be identified in an analytical sample, with a stated degree of confidence, regardless of whether the concentration of the substance in the sample can be quantified.

(13) "Limit of quantitation" means the lowest concentration for an analytical test method and sample matrix at which the quantity of a particular substance can be measured with a stated degree of confidence.

(14) "Monitoring" means all procedures used to collect data on groundwater, surface water or soils.

(15) "Point of standards application" means the specific location, depth or distance from a facility, activity or practice at which the concentration of a substance in groundwater is measured for purposes of determining whether a preventive action limit or an enforcement standard has been attained or exceeded.

(16) "Precision" means the closeness of repeated measurements of the same parameter within a sample.

(17) "Preventive action limit" means a numerical value expressing the concentration of a substance in groundwater which is adopted under s. 160.15, Stats., and s. NR 140.10, 140.12 or 140.20.

(18) "Property boundary" means the boundary of the total contiguous parcel of land owned or leased by a common owner or lessor, regardless of whether public or private roads run through the parcel.

(19) "Registered laboratory" means a laboratory which is registered under s. 144.95 (8), Stats., or receives reciprocal recognition under s. 144.95 (5), Stats.

(20) "Regulatory agency" means the department of agriculture, trade and consumer protection, the department of industry, labor and human relations, the department of transportation, the department of natural resources and other state agencies which regulate activities, facilities or practices which are related to substances which have been detected in or have reasonable probability of entering the groundwater resources of the state.

(21) "Substance" means any solid, liquid, semisolid, dissolved solid or gaseous material, naturally occurring or man-made chemical, parameter for measurement of water quality or biological organism which, in its original form, or as a metabolite or a degradation or waste product, may decrease the quality of groundwater.

(22) "Wastewater and sludge storage or treatment lagoon" means a natural or man-made containment structure, constructed primarily of earthen materials for the treatment or storage of wastewater or sludge, which is not a land disposal system.

History: Cr. Register, September, 1985, No. 357, eff. 10-1-85; cr. (1m), am. (7), (17) and (18), Register, October, 1988, No. 394, eff. 11-1-88.

Subchapter II — Groundwater Quality Standards

NR 140.10 Public health related groundwater standards. The groundwater quality standards for substances of public health concern are listed in Table 1.

Note: For all substances that have carcinogenic, mutagenic or teratogenic properties or interactive effects, the preventive action limit is 10% of the enforcement standard. The preventive action limit is 20% of the enforcement standard for all other substances that are of public health concern. Based on action by the natural resources board, which amended previous enforcement standards while not amending preventive action limits, the preventive action limits for benzene, 1,2-dichloroethane, 1,1-dichloroethylene, fluoride, trichloroethylene and vinyl chloride are less than the percentage of the enforcement standard specified by s. 160.15(1), Stats. Enforcement standards and preventive action limits for additional substances will be added to Table 1 as recommendations are developed pursuant to ss. 160.07, 160.13 and 160.15, Stats.

Table 1
Public Health Groundwater Quality Standards

Substance	Enforcement Standard (micrograms per liter - except as noted)	Preventive Action Limit (micrograms per liter - except as noted)
Alachlor	0.5	0.05
Aldicarb	10	2
Arsenic	50	5
Atrazine	3.5	0.35
Bacteria, Total Coliform	Less than one in 100 ml for membrane filter method or not present in any 10 ml portion by fermentation tube method for both preventive action limit and enforcement standard	
Barium	1 milligram/liter (mg/l)	2 mg/l
Benzene	5	.067
Bromodichloromethane	179	36
Butylate	67	6.7
Cadmium	10	.1
Carbaryl	960	192
Carbofuran	50	10
Carbon Tetrachloride	5	.5
Chloramben	150	30
Chloroform	6	.6
Chromium	50	5
Cyanazine	12.5	1.25
Cyanide	200	40
Dibromochloromethane	215	43
1,2-Dibromoethane (EDB)	.010	.001
1,2-Dibromo-3-chloropropane (DBCP)	.05	.005
Dicamba	300	60
1,2-Dichlorobenzene	1250	125
1,3-Dichlorobenzene	1250	125
p-Dichlorobenzene (1,4-Dichlorobenzene)	75	15
1,1-Dichloroethane	850	85
1,2-Dichloroethane	5	.05
1,1-Dichloroethylene	7	.024
1,2-Dichloroethylene (cis)	100	10
1,2-Dichloroethylene (trans)	100	20
2,4-Dichlorophenoxyacetic Acid	100	20
Dimethoate	2	.4
Dinoseb	13	2.6
Dioxin (2, 3, 7, 8-TCDD)	.00000022	.000000022

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Endrin	.2	.02
EPTC (Eptam)	250	50
Ethylbenzene	1360	272
Fluoride	4 mg/l	.44 mg/l
Fluorotrichloromethane (Freon-11)	3490	698
Lead	50	5
Lindane	.02	.002
Mercury	2	2
Methoxychlor	100	20
Methylene Chloride (Dichloromethane)	150	15
Metolachlor	15	1.5
Metribuzin	250	50
Nitrate + Nitrite (as N)	10 mg/l	2 mg/l
Pentachlorophenol	300	30
Selenium	10	1
Silver	50	10
Simazine	2.15 mg/l	.215 mg/l
Tetrachloroethylene	1	.1
Tetrahydrofuran	50	10
Toluene	343	68.6
Toxaphene	.0007	.00007
1,1,1-Trichloroethane	200	40
1,1,2-Trichloroethane	.6	.06
Trichloroethylene	5	.18
2,4,5-Trichlorophenoxypropionic Acid	10	2
Trifluralin	7.5	.75
Vinyl Chloride	.2	.0015
Xylene	620	124

History: Cr. Register, September, 1985, No. 357, eff. 10-1-85; am. table 1, Register, October, 1988, No. 394, eff. 11-1-88; am. table 1, Register, September, 1990, No. 417, eff. 10-1-90.

NR 140.12 Public welfare related groundwater standards. The groundwater quality standards for substances of public welfare concern are listed in Table 2.

Note: For each substance of public welfare concern, the preventive action limit is 50% of the established enforcement standard.

Table 2
Public Welfare Groundwater Quality Standards

Substance	Enforcement Standard (milligrams per liter - except as noted)	Preventive Action Limit (milligrams per liter - except as noted)
Chloride	250	125
Color	15 color units	7.5 color units
Copper	1.0	.5
Foaming agents MBAS (Methylene-Blue Active Substances)	.5	.25
Iron	.3	.15
Manganese	.05	.025
Odor	3 (Threshold Odor No.)	1.5 (Threshold Odor No.)
Sulfate	250	125
Zinc	5	2.5

History: Cr. Register, September, 1985, No. 357, eff. 10-1-85; am. table 2, Register, October, 1990, No. 418, eff. 11-1-90.

NR 140.14 Statistical procedures. (1) If a preventive action limit or an enforcement standard for a substance listed in Table 1 or 2, an alternative concentration limit issued in accordance with s. NR 140.28 or a preventive action limit for an indicator parameter established according to s. NR 140.20 (2) is attained or exceeded at a point of standards application:

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(a) The owner or operator of the facility, practice or activity at which a standard is attained or exceeded shall notify the appropriate regulatory agency that a standard has been attained or exceeded; and

(b) The regulatory agency shall require a remedial response in accordance with the rules promulgated under s. 160.21, Stats. No remedial response shall be required if it is demonstrated to the satisfaction of the appropriate regulatory agency that a scientifically valid determination cannot be made that the preventive action limit or enforcement standard for a substance in Table 1 or 2 has been attained or exceeded based on consideration of sampling procedures or laboratory precision and accuracy, at a significance level of 0.05.

(2) The regulatory agency shall use one or more valid statistical procedures to determine if a change in the concentration of a substance has occurred. A significance level of 0.05 shall be used for all tests.

(3) In addition to sub. (2), the following applies when a preventive action limit or enforcement standard is below the limit of quantitation:

(a) If a substance is not detected in a sample and the limit of detection is higher than the preventive action limit or enforcement standard for that substance, the preventive action limit or enforcement standard shall be considered not to have been attained or exceeded.

(b) If a substance is reported to be present in a sample above the limit of detection but below the limit of quantitation, and if the preventive action limit or enforcement standard for that substance is below the limit of detection, the preventive action limit or enforcement standard shall be considered to have been attained or exceeded only if the presence of that substance has been confirmed by the use of an appropriate statistical test at a significance level of 0.05.

(c) The owner or operator of the facility, practice or activity shall report the limit of detection and the limit of quantitation with the sample results when requested by the regulatory agency.

History: Cr. Register, September, 1985, No. 357, eff. 10-1-85; am. (1) (Intro.) and (b), r. and recr. (2), Register, October, 1988, No. 394, eff. 11-1-88; am. (1) (b), (2) and (3) (b), Register, September, 1990, No. 417, eff. 10-1-90.

NR 140.16 Monitoring and laboratory data requirements. (1) All water quality samples collected to determine compliance with ch. 160, Stats., except samples collected for total coliform bacteria analysis and field analyses for pH, specific conductance, and temperature, shall be analyzed by a laboratory certified or registered under ch. NR 149. Samples for total coliform bacteria analysis shall be analyzed by the state laboratory of hygiene or at a laboratory approved or certified by the department of health and social services. The results of the analysis shall be submitted to the department and the appropriate regulatory agency. Except as provided in s. NR 205.07 (3) (c) for wastewater permittees, this subsection does not require the submission of groundwater monitoring data which is collected voluntarily and which is not being collected to determine compliance with this chapter. The samples shall be collected in accordance with procedures specified by the department or, where no procedures are specified, in accordance with published sampling procedures.

Note: Published sampling procedures include those contained in the following sources. Other published sampling procedures are also acceptable.

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1. "Groundwater Sampling Procedures Guidelines." Wisconsin Department of Natural Resources, PUBL-WR-153, February 1987.
2. "Groundwater Sampling Procedures Field Manual." Wisconsin Department of Natural Resources, PUBL-WR-168, September 1987.
3. "Procedures Manual for Ground Water Monitoring at Solid Waste Disposal Sites." EPA SW-611, Office of Water and Waste Management, U.S. Environmental Protection Agency, Dec. 1980, Washington, D.C.
4. "Techniques of Water Resources Investigations of the United States Geological Survey, Guidelines for Collection and Field Analysis of Ground Water Samples for Selected Unstable Constituents," Book 1, Chapter D2, U.S. Geological Survey, Washington, D.C.
5. "Procedures for the Collection of Representative Water Quality Data from Monitoring Wells," Cooperative Groundwater Report 7, Illinois State Water Survey, 1981, Champaign, Illinois.
6. "Manual of Ground Water Sampling Procedures," NWWA/EPA Series, Robert S. Kerr, Environmental Research Laboratory, 1981, Ada, Oklahoma.

(2) The laboratory shall utilize the analytical methodology specified in rules or approved by the regulatory agency. Where no analytical methodology is specified, the laboratory shall use an analytical methodology with a limit of detection and limit of quantitation below the preventive action limit. Where the limit of detection or limit of quantitation is above the preventive action limit for that substance, the laboratory shall use the best available analytical methodology to produce the lowest limit of detection and limit of quantitation.

(3) If the owner or operator of a facility, practice or activity believes that a sample result does not represent groundwater quality in the vicinity of the facility, practice or activity, the owner or operator shall resample the appropriate well or wells to obtain a representative sample at the earliest possible time. All sample results shall be submitted to the department and the appropriate regulatory agency with an explanation of why the owner or operator believes that all or some of the results are invalid.

History: Cr. Register, September, 1985, No. 357, eff. 10-1-85; am. (1), Register, September, 1990, No. 417, eff. 10-1-90.

Subchapter III — Evaluation and Response Procedures

NR 140.20 Indicator parameter groundwater standards. (1) **ESTABLISHING BACKGROUND WATER QUALITY.** Background water quality at a facility, practice or activity at which monitoring is required shall be established by sampling one or more monitoring points at locations and depths sufficient to yield groundwater samples that are representative of background water quality at or near the facility, practice or activity. Background water quality shall be determined for indicator parameters specified by the department. Background water quality for indicator parameters shall be established by averaging a minimum of 8 sample results from each well. The department may exclude any sample result which is nonrepresentative of background water quality. In making the calculations required in this section, the department may use as many representative sample points as are available.

(2) **ESTABLISHING PREVENTIVE ACTION LIMITS FOR INDICATOR PARAMETERS.** For each indicator parameter for which groundwater monitoring is required by the department, the preventive action limit shall be established based upon a change of water quality with respect to background water quality according to the methodology specified in pars. (a) to (c) and in Table 3.

(a) For field pH, the preventive action limit shall be one pH unit above or below the pH of the background water quality.

(b) For field temperature, the preventive action limit shall be 3 standard deviations or 10°F (5.6°C), whichever is greater, above or below the temperature of the background water quality.

(c) For all other indicator parameters, the preventive action limit shall be the background water quality for that parameter plus 3 standard deviations or the background water quality plus the increase of that parameter listed in Table 3, whichever is greater.

Note: The standard deviation for a group of samples is equal to the square root of: the value of the sum of the squares of the difference between each sample in the sample group and the mean for that sample group divided by the number of samples in the sample group where the sample group has 30 or more samples and by one less than the number of samples in the sample group where the sample group has less than 30 samples.

Table 3
Methodology for Establishing Preventive Action Limit for Indicator Parameters

Parameter	Minimum Increase (mg/l)
Alkalinity	100
Biochemical oxygen demand (BOD ₅)	25
Boron	2
Calcium	25
Chemical oxygen demand (COD)	25
Magnesium	25
Nitrogen series	
—Ammonia nitrogen	2
—Organic nitrogen	2
—Total nitrogen	5
Potassium	5
Sodium	10
Field specific conductance	200 micromhos/cm
Total dissolved solids (TDS)	200
Total hardness	100
Total organic carbon (TOC)	1
Total organic halogen (TOX)	.25

History: Cr. Register, September, 1985, No. 357, eff. 10-1-85; am. table 3, Register, October, 1990, No. 418, eff. 11-1-90.

NR 140.22 Point of standards application. (1) Facilities, practices or activities regulated by the department shall be designed to minimize the level of substances in groundwater and to comply with the preventive action limits to the extent technically and economically feasible at the following locations:

- (a) Any point of present groundwater use;
- (b) Any point beyond the boundary of the property on which the facility, practice or activity is located; and
- (c) Any point within the property boundaries beyond the 3-dimensional design management zone if one is established by the department at each facility, practice or activity under sub. (5).

(2) The point of standards application to determine if a preventive action limit has been attained or exceeded is any point at which groundwater is monitored.

(3) The point of standards application to determine whether an enforcement standard has been attained or exceeded shall be the following locations:

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- (a) Any point of present groundwater use;
- (b) Any point beyond the boundary of the property on which the facility, practice or activity is located;
- (c) Any point within the property boundaries beyond the 3 dimensional design management zone if one is established by the department at each facility, practice or activity under sub. (5).

Note: The boundary beyond which the enforcement standards apply is the closer of the property boundary or the design management zone boundary to the waste boundary for the facility, practice or activity.

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