

NIR 110, 210



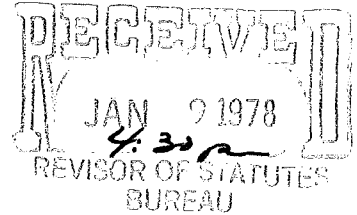
State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Anthony S. Earl  
Secretary

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IN REPLY REFER TO: \_\_\_\_\_

STATE OF WISCONSIN )  
 )  
DEPARTMENT OF NATURAL RESOURCES ) SS



TO ALL TO WHOM THESE PRESENTS SHALL COME, GREETINGS:

I, Anthony S. Earl, Secretary of the Department of Natural Resources and custodian of the official records of said Department, do hereby certify that the annexed copy of Natural Resources Board Order No. WQ-54-77 was duly approved and adopted by this Department on September 22, 1977. I further certify that said copy has been compared by me with the original on file in this Department and that the same is a true copy thereof, and of the whole of such original.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the official seal of the Department at Pyare Square Building in the Village of Shorewood Hills, this 6<sup>th</sup> day of January, 1978.

Anthony S. Earl, Secretary

(SEAL)

STATE OF WISCONSIN NATURAL RESOURCES BOARD

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IN THE MATTER of repealing and recreating .  
sections NR 110.15(1)(c) and NR 110.23 .  
and creating section NR 210.09 of the . WQ-54-77  
Wisconsin Administrative Code pertaining .  
to disinfection of wastewater .  
.....

ORDER OF THE STATE OF WISCONSIN NATURAL RESOURCES BOARD

REPEALING AND RECREATING, AND CREATING RULES

Pursuant to the authority vested in the State of Wisconsin Natural Resources Board by sections 144.025(2)(b) and (c), 144.04, 147.04, 147.08 and 227.014(2), Wisconsin Statutes, the State of Wisconsin Natural Resources Board hereby repeals and recreates, and creates rules as follows:

SECTION 1 - Section NR 110.15 (1) (c) is repealed and recreated to read:

(c) All effluents discharged to a receiving surface water, except from stabilization ponds, shall be properly disinfected in accordance with NR 110.23.

SECTION 2 - Section NR 110.23 is repealed and recreated to read:

NR 110.23 Disinfection. (1) General. Continuous disinfection shall be provided to reduce the risk of a public health hazard. Exceptions to this requirement are as follows:

(a) Stabilization lagoon treatment systems as described in NR 110.28 are exempt from the disinfection requirement. However, where the department of natural resources determines that short circuiting within such a system might cause a potential risk to public health due to the lack of adequate detention time, requirements for disinfection may be imposed in specific cases. Aerated lagoon treatment systems as described in NR 110.28 are required to disinfect as required by this section.

(b) In areas where it can be shown that the costs exceed the benefits derived from the disinfection of secondary or higher level of treated effluent,

the owner may request that the department waive or modify the requirements for disinfection. The owner must submit to the department, for its review, specific data to justify any modification of the disinfection requirements.

(2) Types of disinfection. Chlorine is the most commonly used chemical. However, the department encourages the owner to evaluate the cost-effective application of ozone, bromine, bromine chloride, ultraviolet light, and other chemicals or methods or combinations of methods in individual cases. Where a disinfection process other than chlorine is proposed, supporting data from pilot plant installations or similar full-scale installations shall be submitted as a basis upon which the owner or the owner's representative may design the system.

(3) Feed equipment - chlorine. (a) Type. Solution-feed vacuum type chlorinators or positive displacement type hypochlorite feeders are recommended.

(b) Capacity. Required capacity will vary, depending on the uses and points of application of the disinfectant. Caution should be used to not over-size the units.

(4) Measurement techniques. (a) Residual chlorine. Residual chlorine concentrations shall be measured in accordance with Wis. Adm. Code chapter NR 219.

(b) Bacteriological measurements. Coliform content of effluents shall be measured in accordance with Wis. Adm. Code chapter NR 219.

(5) Chlorine supply. (a) Cylinders. Cylinders must comply with department of transportation regulations concerning placards and labels. Furthermore, only chlorine institute approved valves can be used in this service.

(Note: The department recommends consideration of one ton containers of chlorine where the average daily chlorine consumption is over 150 pounds. However, both monetary cost and potential residential exposure to chlorine should be evaluated when making a final decision. The department recommends that the cylinders be hydrostatically tested for integrity every 5 years.)

(b) Scales. Scales or other means of determining chlorine usage must be provided at all plants using chlorine gas for disinfection. Scales shall be of corrosion-resistant material.

(Note: At large plants, scales of the indicating and recording type are recommended.)

(c) Evaporators. Evaporators for converting liquid chlorine to a gas can be used where manifolding of ton units to increase gas flow is impractical or imprudent.

(d) Leak detection and controls. A bottle of 56% ammonium hydroxide solution shall be available for detecting chlorine leaks. Where ton containers are used, a leak repair kit approved by the chlorine institute shall be provided.

(Note: The department recommends that caustic soda solution reaction tanks be installed where practical for absorbing the contents of leaking one ton cylinders where such cylinders are in use. At large installations the department recommends that automatic gas detection and related alarm equipment be installed.)

(6) Piping and connections. (a) Only piping systems specifically manufactured for chlorine service are approvable. The specifications of the chlorine institute should be used as guidelines.

(b) Due to the corrosiveness of wet chlorine, all lines designed to handle dry chlorine must be protected from the entrance of water or air containing water.

(7) Housing. (a) Separation. If gas chlorination equipment and chlorine cylinders are to be in a building used for other purposes, a gas-tight partition shall separate this room from any other portion of the building. Doors to this room shall open only to the outside of the building, and shall be equipped with panic or emergency hardware. Such rooms shall be at least 6"

above ground level, and must permit easy access to all equipment. Storage area shall be separated from the feed area where one ton or larger cylinders are used.

(b) Inspection window. A clear glass, gas-tight window shall be installed in an exterior door or interior wall of the chlorinator room to permit the chlorinator to be viewed without entering the room.

(c) Temperature control. Chlorinator rooms and cylinders in use shall be maintained at a temperature not less than 60°F and not greater than 140°F.

(d) Ventilation. Forced, mechanical ventilation shall be installed which will provide one complete air change per minute. The entrance to the air exhaust duct from the room shall be near the floor and the point of discharge shall be so located as not to contaminate the air inlet to any buildings or inhabited areas. Air inlets shall be so located as to provide cross ventilation and at such a temperature that will not adversely affect the chlorination equipment. The vent hose from the chlorinator shall discharge to the outside atmosphere above grade.

(e) Electrical controls. The controls for the fans and lights shall be such that the fans and lights will automatically operate when the door is opened and can also be manually operated from the outside without opening the door.

(8) Safety equipment. Respiratory air-pack protection equipment, meeting the requirements of the national institute for occupational safety and health (NIOSH) shall be available where chlorine gas is handled, and shall be stored at a convenience location, but not inside any room where chlorine is used and stored. The units shall use compressed air or oxygen, have at least 30-minute capacity, and be compatible with the units used by the fire department responsible for the plant.

(9) Application of chlorine. (a) Initial mixing. The chlorine shall be mixed as rapidly as possible. This may be accomplished by either the design of a turbulent flow regime or the use of a mechanical flash mixer.

(b) Contact time. After rapid mixing, a contact time of at least one hour at average design flow or 30 minutes at peak daily design flow shall be provided. The hydraulic characteristics of the contact zone must be equivalent to that achieved by a tank with a length to width ratio of 40:1 or more. A tank of this type could be expected to have a dispersion index of 0.02 and a Morrill index of less than 2.0.

(c) The hydraulic characteristics of a contact zone with a length to width ratio less than 40:1 must be certified at the time of construction by the submission of the results of field test. It is recommended that the basin have provisions for cleaning which will not interrupt the disinfection process.

(10) Chlorine control systems. In all systems, with design flow of greater than 0.25 MGD the feed mechanism shall be provided with either an automatic flow proportional control or an automatic residual control. The department encourages the consideration of a "compound loop control" at plants with an average design flow of greater than one MGD.

(a) All sample lines should be designed to provide easy cleaning and to minimize biofouling. The department will inspect the chlorine control system on an annual basis to assure that it is being properly operated and maintained.

(11) Dechlorination. In instances where chlorine is used, the most practical method of lessening toxicity of residual chlorine present in the effluent will usually be dechlorination of the effluent by the use of sulfur dioxide, sodium biosulfite, sodium thiosulfate, or sodium metabisulfite. In instances where dechlorination of the effluent may be required, alternative forms of disinfection should be evaluated which may result in a lower total

system cost. The most common chemical used to dechlorinate wastewater in large treatment plants (greater than one MGD) is sulfur dioxide and in smaller plants sodium metabisulfite. In both instances the following apply. (In certain individual cases, the use of activated carbon may be approved for the purpose of dechlorination.)

(a) Feed equipment. When using sulfur dioxide, the feed equipment is essentially the same as that used for the application of chlorine, and similar precautions must be observed. When using sodium metabisulfite, the chemical may be fed either in the dry form or as a solution and metered with a diaphragm pump. Although similar equipment is used, the same piece of equipment shall not be interchanged with the chlorine application equipment.

(b) Mixing. The chemical shall be mixed such that complete dispersion is achieved before the effluent reaches the receiving water.

(c) Contact time. When complete mixing has been achieved, no further contact time is necessary.

(d) Control system. At the present time it is not practical to continuously monitor the sulfite ion. The most practical method is to intermittently divert a portion of the final effluent to a chlorine residual analyzer (which is suggested for all chlorination-dechlorination systems) for a short period each one-two hours to allow the recorder to measure the residual chlorine. The residual should be essentially zero.

(e) Sulfur dioxide supply. The supply system should be designed similar to the chlorine system.

(f) Safety. Safety equipment is similar to that used for chlorine.

(g) Reaeration. Reaeration of the effluent may be necessary before the discharge to achieve an adequate dissolved oxygen level in the stream. The dissolved oxygen requirements as required in Wis. Adm. Code chapter NR 104 shall be used as a basis for the determination of the need for and capacity of reaeration facilities.

SECTION 3 - Section NR 210.09 is created to read:

NR 210.09 Disinfection. (1) General. Continuous disinfection shall be provided to reduce the risk of a public health hazard.

(a) Where disinfection is required, the geometric mean of the fecal coliform bacteria for effluent samples collected in a period of 30 consecutive days shall not exceed 400 per 100 milliliters.

(b) Chlorine, when used as an effluent disinfectant shall not exceed 0.5 milligrams per liter of total residual chlorine in the effluent when discharged.

(c) The effluent limitations described in NR 219.09(a) and (b) shall be met on or before July 1, 1982.

(2) Stabilization lagoon treatment systems as defined in Wis. Adm. Code section NR 110.28 are exempt from the disinfection requirement. However, when the department determines that short circuiting within such a system might cause a potential risk to public health due to the lack of adequate detention time, requirements for disinfection may be imposed in specific cases. Aerated lagoon treatment systems as described in Wis. Adm. Code section NR 110.28 shall disinfect as required by this section.

(3) If a permittee demonstrates to the satisfaction of the department that the costs exceed the benefits derived from the disinfection of secondary or higher level of treated effluent, the department may waive or modify the requirements for disinfection. The owner must submit to the department for its review, specific data to justify any modification requested in the requirements.

The foregoing rules were approved and adopted by the State of Wisconsin Natural Resources Board on September 22, 1977.



The rules contained herein shall take effect upon publication.

Dated at Madison, Wisconsin

6 January 1978

STATE OF WISCONSIN DEPARTMENT OF NATURAL RESOURCES

By

Anthony S. Earl

Anthony S. Earl, Secretary

(SEAL)