

ORDER OF THE STATE OF WISCONSIN NATURAL RESOURCES BOARD
REPEALING, RENUMBERING, RENUMBERING AND AMENDING, AMENDING, REPEALING AND
RECREATING, AND CREATING RULES

The Wisconsin Natural Resources Board adopts an order to repeal NR 333.03(5), (8), (17), (20) and (26); and 333.07(1); to renumber NR 333.03(1) to (4), (9), (14) to (16), (21) to (25), (27) and 28; to renumber and amend NR 333.07(2) to (4); to amend NR 116.08(1), (2), (3)(title), 1. to 5., (a), (b), (c), (4)(title), (a), (b) and (5)(a); to repeal and recreate NR 333.04, 333.05(2) and 333.06; and to create NR 333.03(4), (9) and (13) relating to dam design and construction standards and zoning downstream of dams.

WT-34-00

Analysis Prepared by the Department of Natural Resources

Authorizing statutes: ss. 31.02(2), 31.19, 31.33, 87.30, and 227.11(2)(a), Stats.

Statutes interpreted: ss. 31.02(2), 31.19, 31.33 and 87.30, Stats.

The proposed rule will revise standards for dam design and construction by adding definitions for development, land use controls and open space use. The proposed rule eliminates the unnecessary term “preliminary dam hazard rating” in favor of “dam hazard rating” and allows for the assignment of a dam hazard rating for existing dams after a directive in a dam safety inspection report is issued and clarifies that the necessary dam failure analysis is to be provided by the owner.

The proposed rule provides more detail on the minimum contents of the required engineering consultant’s report on the engineering hydraulic, hydrologic and stability analyses and eliminates suggested dam breach parameters since they are in the DAMBRK and FLDWAV computer model user documentation.

The proposed rule includes a requirement for a dam owner to submit the estimated cost of removing the dam and restoring the channel to its natural condition and allows the dam owner to use that estimate if less than the cost of construction or repair of the dam to meet the financial assurance requirements.

The proposed rule greatly simplifies language on dam hazard rating determinations and adds language that considers the potential or probable loss of human life in the hazard rating definitions.

The proposed rule eliminates the unnecessary distinction between minor and major dams.

The proposed rule specifies minimum standards for an adequate emergency action plan in the event of a dam failure.

The proposed rule extends required time limits for Department approvals or actions.

The proposed rule eliminates the existing paradox that a dam owner could face by trying to comply with NR 333 requirements to secure a low hazard rating for the dam and the associated less costly lower spillway capacity requirements. Once the dam has met the low hazard requirements of NR 333 it can be considered a “safe” dam under the current NR 116.08 standards. This would then allow a community to adopt floodplain zoning downstream of a “safe” dam that could allow development to occur below the dam. This new development would then change the dam hazard rating to significant or high and would require the dam owner to undertake significant and potentially costly modifications to increase the dam’s spillway capacity to the higher requirements of NR 333 for significant or high hazard dams. Without this concurrent revision to NR 116 changing the terminology from “safe” to “compliant”, it could be very difficult to convince a dam owner of the advantages, cost savings, reduced liability and greater protection of life, health, and property gained by securing a low hazard rating for the dam.

SECTION 1. NR 116.08(1), (2), (3)(title), (a)1. to 5., (b), (c), (4)(title), (a), (b) and (5)(a) are amended to read:

NR 116.08(1) GENERAL. Adequately designed, constructed and maintained dams provide reduced damages and relief from flooding for developed areas. Areas downstream of dams shall be zoned and regulated by municipalities with floodplain zoning ordinances in compliance with the standards in this section, to reduce potential loss of life and property located downstream of the dams. Except as provided in sub. (2), areas downstream of all dams shall be delineated on floodplain maps in accordance with s. NR 116.09(1)(b)5. Flood studies and related mapping, completed and adopted prior to (the effective date of this rule ... [revisor insert date], which calculated flood flow attenuation based on the existence of the dam structures within the contributing basin, may continue to use the dam in-place, no failure, profile.

(2) EXEMPTIONS. All dams having a structural height of 6 feet or less, or a storage capacity of 15 acre feet or less, and all dams having a structural height of more than 6 feet but less than 25 feet with a storage capacity of less than 50 acre feet or less are exempt from the requirements of this section unless the department determines pursuant to s. 31.19, Stats., that the dam is likely to endanger life, health or property.

(3)(title) ~~SAFE COMPLIANT~~ DAMS. (a) A dam is considered safe compliant if all the following requirements ~~in this paragraph~~ are met:

1. The dam is structurally adequate to meet the conditions in ss. NR 333.05(2)(~~g~~) (k) and 333.07 (4) (3) (b);
2. The dam is hydraulically adequate to meet the standards in s. NR 333.07 (2); (1).
3. The dam has been certified by a professional engineer, registered in Wisconsin, to meet the requirements of subds. 1. and 2.;
4. Written assurance of the dam owner's ability to operate and maintain the dam in good condition is obtained from the dam owner;
5. An emergency action plan to minimize loss of human life has been adopted by the municipality developed for the area downstream of the dam based on the assumption that the dam fails during the regional flood; and

(b) Developed areas downstream of a safe dam compliant dams shall be zoned and regulated as follows:

1. For high hazard dams, assuming that the dam is in-place nonexistent during the regional flood.
2. For significant or low hazard dams, assuming the dam fails during the regional flood.

(c) Undeveloped areas downstream of a safe compliant dam shall be zoned and regulated assuming that the dam ~~does not exist~~ fails during the regional flood.

(4)(title) ~~UNSAFE NONCOMPLIANT~~ DAMS. (a) If an existing dam does not meet the standards in sub. (3)(a), the dam is considered unsafe noncompliant.

(b) Both developed and undeveloped areas downstream of an unsafe a noncompliant dam shall be zoned and regulated assuming that dam failure occurs during the regional flood.

(5)(a) Dams constructed after ~~March 1, 1986~~ the effective date of this rule ... [revisor insert date] shall be considered safe compliant if the requirements in sub. (3)(a) are met.

SECTION 2. NR 333.02 is amended to read:

NR 333.02 Applicability. (1) The provisions of this chapter are ~~not~~ applicable to dams not owned by the United States government that:

(1) ~~Dams owned by the United States government.~~ (a) Have a structural height of more than 6 feet and a maximum storage capacity of 50 acre-feet or more of water.

~~(2) Dams having the following characteristics, unless~~ (b) Have a structural height of 25 feet or more and a maximum storage capacity of more than 15 acre-feet of water.

~~(c) Have a structural height of 6 feet or less or a maximum storage capacity of less than 50 acre-feet of water if the department determines that the dam is likely to endanger life, health or property if it is not designed, constructed or reconstructed in accordance with this chapter.~~

~~(a) All dams having a structural height of 6 feet or less, or a storage capacity of 15 acre-feet or less.~~

~~(b) All dams having a structural height of more than 6 feet but less than 25 feet and a maximum storage capacity of less than 50 acre-feet of water.~~

~~(3)~~ (2) All new and existing dams inspected, approved and licensed by a federal agency under 18 CFR Part 12, are exempt from the provisions of this chapter provided that the dam meets requirements which are at least as restrictive as the requirements of this chapter.

Note: Dams exempted from this chapter are still subject to the requirements of ch. 31, Stats., including, but not limited to, the requirements for permits and plan approvals.

SECTION 3. NR 333.03(5), (8), (17), (20) and (26) are repealed.

SECTION 4. NR 333.03(1) to (4), (9), (13) to (16), (21) to (25), (27) and (28) are renumbered NR 333.03(2) to (4), (1), (8), (14) to (17), (20) to (26), respectively, and subs. (1), (3), (15), (24) and (26), as renumbered, are amended to read:

NR 333.03(1) "~~Emergency~~ Auxiliary spillway" means a secondary spillway designed to pass water only during flows exceeding the capacity of the principal spillway.

(3) "Dam" means any artificial barrier, ~~together with appurtenant works, which is built in or across a waterway and watercourse~~ which has the primary purpose of impounding or diverting water. A dam includes all appurtenant works, such as a dike, canal or powerhouse.

(15) "Owner" means any individual, partnership, public utility, company, cooperative, trust, corporation, association, state or interstate agency, city, village, town, county or special purpose district such as a drainage district or a public inland lake protection and rehabilitation district which has title to or recorded easement for operation, maintenance and access to a dam or to the specific parcel of land on which a dam exists.

(24) "Structural height" means the difference in elevation in feet between the point of lowest elevation of the top of the dam before overtopping and the lowest elevation of the natural stream or lake bed at the downstream toe of the dam.

(26) "Total spillway capacity" means the sum of the ~~emergency~~ auxiliary spillway and principal spillway capacities of a dam.

SECTION 5. NR 333.03(5), (9) and (13) are created to read:

NR 333.03(5) "Development" means any artificial change to improved or unimproved real estate not related to allowable open space use including, but not limited to, the construction of buildings, structures or accessory structures; the construction of additions or substantial improvements to buildings, structures or accessory structures; the placement of buildings or structures; and campgrounds.

(9) "Land use controls in place" means future development within the hydraulic shadow is required to conform to the criteria specified in a zoning ordinance adopted and approved pursuant to s. 87.30, Stats., and also consistent with land use plans developed under s. 66.0295, Stats., or through restrictive covenants, easements, or other appropriate legal arrangements between the owner of the dam and the owners of all property within the hydraulic shadow.

(13) "Open space use" means a use which has a relatively low flood damage potential, such as uses associated with agriculture, recreation, parking, storage yards, or certain sand and gravel operations.

SECTION 6. NR 333.04 is repealed and recreated to read:

NR 333.04 Compliance schedules. (1) **DAM HAZARD RATING.** The department shall assign a dam hazard rating according to the criteria in s. NR 333.06 for all dams subject to the provisions of this chapter. The assignment of a hazard rating shall be based on the findings of a dam failure analysis provided by the owner, pursuant to the standards of s. NR 333.05, according to the following schedule:

- (a) For new dams, prior to granting permission or approval to construct.
- (b) For existing dams which are to be reconstructed, prior to granting permission or approval to reconstruct.
- (c) After a dam failure analysis has been approved by the department or is adopted in a floodplain zoning ordinance pursuant to s. 87.30, Stats., and approved by the department.
- (d) Upon issuance of a department directive in a dam safety inspection report pursuant to s. 31.19, Stats.

(2) **COMPLIANCE.** (a) *New dams.* The design and construction of all new dams shall be in compliance with the requirements of this chapter.

(b) *Existing dams.* The owners of all existing dams shall bring their dams into compliance with the requirements of this chapter within 10 years after being notified of the dam's hazard rating pursuant to sub. (1), unless ordered to do so earlier under s. 31.19(5), Stats.

(3) **ENFORCEMENT.** Administrative orders issued by the department under s. 31.19(5), Stats., may be enforced under ss. 23.50, 23.79(3), 30.03, 31.23(2) and 31.25, Stats.

SECTION 7. NR 333.05(1) is amended to read:

NR 333.05(1) **PLANS AND SPECIFICATIONS.** Plans and specifications prepared by a professional engineer registered in the state of Wisconsin shall be submitted to and approved by the department prior to the construction of a new dam or reconstruction of an existing dam.

SECTION 8. NR 333.05(2) is repealed and recreated to read:

NR 333.05(2) **HYDRAULIC, HYDROLOGIC AND STABILITY ANALYSES.** Hydraulic, hydrologic and stability analyses prepared by a professional engineer registered in the state of Wisconsin shall be submitted to and approved by the department prior to the construction of a new dam or the reconstruction of an existing dam. These analyses shall be conducted according to accepted engineering practice and unless the department determines otherwise shall be submitted in the form of a report which includes, at a minimum:

- (a) Purpose of the report. Development of an emergency action plan, floodplain zoning or development of the hazard rating for the dam.
- (b) Roles and participation of other agencies -- DNR, DEG, community officials, other agencies.
- (c) Data collection methods and sources of information -- Development of cross sectional data, description of past flooding events, reference to previous studies, current floodplain zoning map.
- (d) Methodologies and procedures -- Operation of dam during high water, breach parameters, description of all spillway components, scenario for failure, failure conditions.
- (e) Regional flood flows calculated in conformance with the standards in s. NR 116.07(3).
- (f) Hydraulic modeling -- Determination and delineation of the following hydraulic conditions during the regional flood, using the standards in s. NR 116.07(4):

1. Hydraulic shadow -- assuming that the dam is in existence and fails. Failure shall be considered to occur at the maximum upstream water elevation or at the point of overtopping, based upon the physical conditions at the dam.

2. Dam in place, no failure -- assuming the dam operates in accordance with its department approved operation plan, if one is available, or not operated if there is no plan.

3. Dam nonexistent -- assuming the dam has been removed and the natural stream cross-section is restored.

Note: For suggested dam breach parameters, see the National Weather Service "DAMBRK or FLDWAV Users Manuals.

(g) Comparison table -- Summary by cross section of the maximum flood elevation for the 3 hydraulic conditions.

(h) Determination of the dam hazard rating using the criteria in s. NR 333.06.

(i) Design flood flows, based on the hazard rating and the hydraulic design standards in s. NR 333.07.

(j) Calculations for routing of the design flood through the structure. Starting conditions for the routing shall be at the normal pool and normal flow tailwater elevations.

(k) Stability analysis of the dam, which considers sliding, overturning and foundation failure during base flow conditions and at maximum load conditions, including ice loading, during routing of the design flood through the dam.

(L) Appendices:

1. Plan view of the dam.

2. Elevation view of the dam from downstream including breach geometry.

3. Pertinent elevations of the dam.

4. Stage vs. storage curve or area vs. volume curve, or both.

5. Spillway capacity rating curves or calculations, where appropriate.

6. Downstream water surface profiles and floodway data tables, for the dam failure, and the with and without dam conditions, during the regional flood.

7. Maps for the 3 modeled conditions, with cross section locations and structure identification adequate to determine the hazard rating for the dam, for the dam failure condition map, showing the floodway, and to an appropriate scale consistent with the community floodplain zoning map.

8. Cross section plots of actual field cross sections and comparison with dam break input cross sectional data.

9. Hard copy and data disk with computer input and output for all modeled conditions, including hydrology and hydraulic runs.

10. Other supporting calculations as the department deems necessary.

Note: Mapping, profiles and floodway data tables must be suitable for zoning purposes, as required in s. NR 116.07(4).

SECTION 9. NR 333.05(3) is amended to read:

NR 333.05(3) ESTIMATED COSTS. The estimated cost of construction of the new dam or reconstruction of the existing dam, and the estimated cost of ~~restoring the reconstructed existing dam to a safe condition~~ removing the dam and restoring the channel to its natural condition, shall be submitted to the department prior to the construction of a new dam or reconstruction of an existing dam.

SECTION 10. NR 333.06 is repealed and recreated to read:

NR 333.06 Dam hazard ratings. (1) A hazard rating of low, significant or high for all existing and proposed dams shall be determined in accordance with the following criteria:

(a) *Low hazard.* A low hazard rating shall be assigned to those dams that have no development unrelated to allowable open space use in the hydraulic shadow where the failure or mis-operation of the dam would result in no probable loss of human life, low economic losses (losses are principally limited to the owners property), low environmental damage, no significant disruption of lifeline facilities, and have land use controls in place to restrict future development in the hydraulic shadow.

(b) *Significant hazard.* A significant hazard rating shall be assigned to those dams that have no existing development in the hydraulic shadow that would be inundated to a depth greater than 2 feet and have land use controls in place to restrict future development in the hydraulic shadow. Potential for loss of human life during failure must be unlikely. Failure or mis-operation of the dam would result in no probable loss of human life but can cause economic loss, environmental damage, or disruption of lifeline facilities.

(c) *High hazard.* A high hazard rating shall be assigned to those dams that have existing development in the hydraulic shadow that will be inundated to a depth greater than 2 feet or do not have land use controls in place to restrict future development in the hydraulic shadow. This rating must be assigned if loss of human life during failure or mis-operation of the dam is probable.

(2) The owner of a dam may request that the department change the hazard rating of an existing or proposed dam by submitting adequate information which demonstrates that the land use and land use controls downstream from the dam meet the requirements for a different hazard rating. The department shall advise the owner of its action on the requested change within 90 business days after receiving the request.

SECTION 11. NR 333.07(1) is repealed.

SECTION 12. NR 333.07 (2) to (4) are renumbered (1) to (3) and, as renumbered NR 333.07 (1), (2), (3)c and d are amended to read:

NR 333.07 (1) MINIMUM HYDRAULIC CAPACITY. Except as provided in sub. ~~(3)~~ (2), all proposed and existing dams shall have the minimum hydraulic capacity shown in Table ~~III I~~:

Table ~~III I~~
Required Spillway Design Capacities

Dam Hazard Rating	Size Classification	Minimum Principal Spillway Capacity	Minimum Total Spillway Capacity
Class IA (Low) -	Minor	Q ₁₀	Q ₅₀
	Major	Q ₁₀	Q ₅₀
Class IB (Low) (L)	Minor	Q ₁₀	Q ₁₀₀
	Major	Q ₂₅	Q ₂₀₀
Class II (Significant) (S)	Minor	Q ₂₅ Q ₅₀	Q ₂₀₀ Q ₅₀₀
	Major	Q ₅₀	Q ₅₀₀
Class III (High) (H)	Minor	Q ₅₀	Q ₅₀₀
	Major	Q ₁₀₀	Q ₁₀₀₀

(2) REDUCED REQUIREMENTS. (a) Unless the department determines that public safety requires full compliance with the substantive requirements of this rule, all dams which will be submerged by flows less than the minimum hydraulic capacity specified in Table III I shall be designed to pass the flow of the river at submergence.

(b) Any owner may provide documentation to justify a different spillway capacity from that specified in Table III I. The department shall review such documentation and may approve the spillway capacity proposed by the owner if it determines that such capacity will not result in an additional hazard to life, health or property when compared to the capacity specified in Table III I.

(3)(c) An adequate emergency action plan shall be prepared for the area downstream from the dam in consultation with the local unit of government and concurred in by the division of emergency government. An adequate emergency action plan shall include, but is not limited to, the following information:

1. A notification flowchart identifying involved agencies, other dam owners both upstream and downstream and their phone numbers.

2. Emergency operation procedures.

3. An inundation map of the hydraulic shadow on a scale of 1" = 2000' or less that extends downstream to an elevation within one foot of the dam nonexistent profile.

4. Procedures for notification of all property owners affected by a dam failure and a list of their names, addresses and phone numbers.

Note: For additional information on emergency action plans refer to Chapter 6 of the Federal Energy Regulatory Commission's "Engineering Guidelines for the Evaluation of Hydropower Projects".

(d) Documentation showing that the requirements of pars. (a) to (c) have been met shall be submitted to the department for approval. The department shall review and approve or disapprove of the documented safety measures in writing within ~~45~~ 90 business days after the department receives the documentation.

SECTION 13. NR 333.08(3) is amended to read:

NR 333.08(3) All dams shall be constructed or reconstructed under the supervision of a professional engineer registered in the state of Wisconsin ~~or a representative of an engineering company licensed to do business in the state of Wisconsin.~~ The supervising engineer shall, within 10 days after completing the construction or reconstruction of a dam, submit a statement indicating that the dam was constructed or reconstructed in accordance with the plans and specifications approved by the department under s. NR 333.05.

SECTION 14. NR 333.09 is amended to read:

NR 333.09 (title) Bonding Financial assurance. (1) GENERAL REQUIREMENT. (a) Except as provided in par. (b), the owner of a dam shall file a bond ~~with~~ , escrow account, lien or other financial assurance satisfactory to the department prior to the commencement of construction or reconstruction of the dam. ~~The bond amount of such financial assurance shall equal the estimated cost of restoring a reconstructed dam to a safe condition removing the dam and restoring the stream channel to its natural condition or the cost of constructing or reconstructing the dam, whichever is less, based on the cost estimate submitted by the owner under s. NR 333.05(3).~~

(b) Where the owner is a state or interstate agency or a city, county, village, special purpose district or other unit of government, ~~a bond financial assurance~~ is not required if the owner demonstrates to the department's satisfaction that it has made or will make sufficient funds available to construct or reconstruct the dam or to ~~restore the reconstructed dam to a safe condition~~ remove the dam and restore the stream channel to its natural condition, whichever is less expensive.

(2) NOTIFICATION. As part of its approval of the plans and specifications submitted pursuant to s. NR 333.05, the department shall notify the applicant of the required ~~bonding~~ level of financial assurance.

(3) (title) ~~BOND FORFEITURE~~ REQUIREMENTS. ~~(a) The bond financial assurance filed with the department in the required amount shall be conditioned upon faithful performance of all of the requirements of ch. 31, Stats., the provisions of this chapter, and the conditions of any permit or order issued to the applicant for the dam pursuant to ch. 31, Stats.~~

~~(b) At the option of the applicant, either a performance bond or a forfeiture bond may be filed.~~

~~(c) The bond shall be issued by a surety company licensed to do business in the state of Wisconsin.~~

~~(d) Each bond shall provide that it may not be canceled by the surety company or the owner without the department's consent.~~

~~(e) The bond shall be made payable to the department.~~

(4) RELEASE. The department shall release or authorize the release of the applicant's bond financial assurance within 20 60 business days after the receipt of a request for release if the department finds that the construction or reconstruction has been completed in accordance with the plans and specifications approved by the department, the provisions of this chapter and the conditions of any permit or order issued to the owner of the dam pursuant to ch. 31, Stats.

The foregoing rules were approved and adopted by the State of Wisconsin Natural Resources Board on February 28, 2001.

The rules shall take effect on the first day of the month following publication in the Wisconsin administrative register as provided in s. 227.22(2)(intro.), Stats.

Dated at Madison, Wisconsin _____

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

By _____
Darrell Bazzell, Secretary

(SEAL)