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OFFICE OF WEST VIRGINIA SECRETARY OF STATE

NOTICE OF AGENCY APPROVAL OF A PROPOSED RULE AND FILING WITH THE LEGISLATIVE RULE-MAKING REVIEW COMMITTEE

AGENCY: West Virginia Department of Natural Resources TITLE NUMBER: 47

CITE AUTHORITY West Virginia Code §20-5D-4

AMENDMENT TO AN EXISTING RULE: YES___ NO X

IF YES, SERIES NUMBER OF RULE BEING AMENDED: _____

TITLE OF RULE BEING AMENDED: _____

IF NO, SERIES NUMBER OF NEW RULE BEING PROPOSED: 34

TITLE OF RULE BEING PROPOSED:

Dam Control Regulations

THE ABOVE PROPOSED LEGISLATIVE RULE HAVING GONE TO A PUBLIC HEARING OR A PUBLIC COMMENT PERIOD IS HEREBY APPROVED BY THE PROMULGATING AGENCY FOR FILING WITH THE SECRETARY OF STATE AND THE LEGISLATIVE RULE MAKING REVIEW COMMITTEE FOR THEIR REVIEW.

J. Edward Hamrick III
Director

FISCAL NOTE FOR PROPOSED REGULATIONS

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OFFICE OF WEST VIRGINIA SECRETARY OF STATE

Rule Title: Dam Control Regulations

Type of Rule: X Legislative ___ Interpretive ___ Procedural

Agency: West Virginia Department of Natural Resources

Address: Building 3, State Capitol Complex, Charleston, West Virginia

1. Effect of Proposed Rule (Estimated Total Cost)	ANNUAL Increase $	ANNUAL Decrease $	Current $	FISCAL YEAR Next $	FISCAL YEAR Thereafter $
Personal Services	0	0	0	0	0
Current Expense	0	0	0	0	0
Repairs and Alterations	0	0	0	0	0
Equipment	0	0	0	0	0
Other	0	0	0	0	0

2. Explanation of Above Estimates: The proposed rules will not require an increase or decrease in the budget for enforcement.

3. Objective of These Rules: Rules concerning dams were first promulgated in 1982. Six years of experience in enforcement of the existing rules has demonstrated the need for clarification of requirements for owners, engineers and the for the safety of the general public.

4. Explanation of Overall Economic Impact of Proposed Rule.

   A. Economic Impact on State Government: The impact on state government should be minor. Where the State owns dams, the impact should be the same as for specific industries.

   B. Economic Impact on Political Subdivisions: Where political subdivisions own dams, the impact should be the same as for specific industries.

   Economic Impact on Specific Industries: The proposed rules should increase business for consulting engineers where additional requirements for plans, specifications and certifications will be imposed. The rules may increase business for construction contractors through compliance with better defined specifications. Dam owners should experience minor increase in total costs of building or modifying a dam through fees to engineers and construction contractors.

Economic Impact on Specific Groups of Citizens: Minor economic impact may be expected upon citizens using dams and reservoirs for water supply or recreation through increased usage fees.

C. Economic Impact on Citizens/Public at Large: None. Major effect of proposed rules will be through increased safety to the public at large.

Date: February 14, 1988

J. Edward Hamrick, Jr.

PREAMBLE TO A NEW LEGISLATIVE RULE CONCERNING THE REGULATION OF DAMS

STATE AGENCY: West Virginia Department of Natural Resources

REGULATIONS: Title 47, Series 34, "Dam Control Regulations"

AUTHORITY: W. Va. Code §20-5D-4

ACTION: Approved Rule and Response to Comments

SUMMARY: The Department is proposing to update its legislative rule concerning the certification, construction, and maintenance of dams in conformance with the State's Dam Control Act (W. Va. Code §20-5D). Key provisions of the new rule include:

1. Four new subsections concerning types of dams (Section 3.1), measurement of dams (Section 3.2), dams in series (Section 3.3), and incidental dams such as roadfills (Section 3.4): These subsections delineate how different types of dams are measured and regulated.

2. Two new sections concerning the submission, review, and approval of applications for a certificate of approval (Sections 4 and 5): These sections clarify the necessary components of an application and the procedures used to approve or deny certification.

3. A revised section detailing the organization of the plan package that must be submitted with applications for a certificate of approval (Section 6): This section fosters improved continuity in the plans and specifications submitted for Department approval.

4. A new subsection requiring the preparation of an inventory of sites that are protected under State or federal law (Section 6.4.5): This inventory will aid in the protection of caves, cemeteries, historic sites, and endangered wildlife that might otherwise be disturbed by construction or inundated by the impoundment.

5. A revised section concerning design requirements for dams (Section 7): This section provides expanded guidance relating to hydrology, hydraulics, geotechnical considerations, construction materials, and dam stability.

6. A revised section regarding the construction or modification of a dam after a certificate of approval has been issued (Section 8): This section incorporates requirements for dam foundation preparation, materials placement, spillway construction, and stream diversions. Two new subsections mandate erosion control measures at

dam construction sites (Section 8.1.13) and the proper disposal of construction waste materials (Section 8.1.14). Other new provisions amend existing requirements relating to project quality control (Section 8.2), inspections (Section 8.3), and the reporting of construction progress and problems (Section 8.4).

7. Three new sections concerning the breaching of a dam (Section 9), removal of a dam (Section 10), and abandonment of a dam (Section 11) and a new section governing the reduction of or addition to the height of a dam (Section 12): These sections address activities that may occur under the State's Dam Control Act but which had not been specifically addressed in previous regulations.

8. A new section pertaining to the regulation of dams constructed prior to the enactment of the State's Dam Control Act (Section 13).

9. A new section regarding documentation of dam ownership transfers (Section 14): This section establishes new procedures that will provide the Department with a record of the written agreements related to a transfer of dam ownership and will also provide the purchaser of a dam with notification of the dam's status under the State's Dam Control Act.

10. A revised section concerning operating requirements for dams (Section 15): This section includes provisions delineating the contents of a dam operations plan, requirements governing releases of water, and procedures for dam inspections conducted by the dam owner, the owner's engineer, and the Department. New requirements concerning monitoring plans (Section 15.6), emergency action plans (Section 15.7), and inspection of dams under emergency conditions (Section 15.8) are also included.

11. A revised section concerning the maintenance of dams (Section 16): This section requires the creation of a dam maintenance plan to ensure that a dam owner will not allow his dam to deterioriate over time.

12. A new section detailing the specific conditions under which dam repair work necessitates an application for a certificate of approval (Section 17).

SUPPLEMENTAL INFORMATION: The rule being approved today was designated Series 32 when filed as a proposal with the Secretary of State on February 14, 1989. In order to provide a consecutive numbering of rules currently under development, the Department has chosen to redesignate its proposed dam control regulations as Series 34.

RESPONSE TO COMMENTS: A public hearing on the proposed rule was held on March 22, 1989 in Charleston; one interested individual attended the public hearing but made no comments on the proposed rule. Written comments were submitted by two commenters; those comments and the Department's responses appear below.

Section 2.6

Comment: The definition of "dam" should not be inclusive of the terms "reservoir" and "works appurtenant to (the dam)" but should refer only to the physical structure designed to impound or divert water.

Response: The definition of "dam" was taken from Section 3 of the Dam Control Act and will not be altered by the Department in these regulations.

Section 2.6.2

Comment: This exemption should be revised to read as follows: "Any dam for which the operation and maintenance thereof is the responsibility of and/or regulated by the federal government."

Response: The wording and scope of this exemption is fixed by the Dam Control Act and will not be altered by the Department in these regulations.

Section 2.7.3

Comment: The phrase "significant harm to the environment" should be defined.

Response: The Department agrees with the commenter and has provided a definition of the phrase "significant harm to the environment" based upon the specific types of adverse impacts that could result if a dangerous condition leads to a release of dammed water or waste materials (see Section 2.37).

Section 2.33

Comment: The terms "safety factor" and "factor of safety" are defined with respect to slope stability. This definitional section should be broadened to include other safety factors that are pertinent to dam design.

Response: The Department accepts the commenter's request and has revised this subsection accordingly.

Section 3.4

Comment: One commenter writes:

> "Roadfills" and "Bridges" do not require certificates of approval; "Diversions" do and "Stream Encroachments" may require certificates of approval. It is apparent that any of these structures could be equally hazardous to the public but are not being treated equally in the proposed regulations. Why not treat all structures which do not normally impound water in the same manner as roadfills and bridges?

Response: The Department cannot grant the commenter's request. In accordance with the State's Dam Control Act, a certificate of approval must be obtained for any diversion that meets the definition of a "dam" under Section 2.6 of these regulations. Similarly, stream encroachments may require a certificate of approval in certain circumstances. For example, an encroachment that functioned as a "dam" would require a certificate whereas one which acted merely as an obstruction during high stream flows could be removed by its owner without a certificate of approval.

Sections 3.1.1.c, 3.5.2.a.A, 3.5.2.a.B, and 3.5.2.c.A

Comment: One commenter suggests that the term "waste disposal dams" be redefined so that periodically-cleaned sediment ponds and lagoons, even if they impound waste materials, will not be classified as waste disposal dams. The commenter seeks the exemption of fly ash disposal dams from the provisions of these regulations. If this exemption is not granted, the commenter seeks for the Department to exempt ash disposal dams from regulation on a case-by-case basis.

Response: The Department will not grant either requested exemption because the Dam Control Act mandates that any structure, including a sedimentation pond, that meets the definition of a "dam" must be regulated.

Section 3.5.2.a.B

Comment: If ash disposal dams are not exempted from regulation, then such dams should be classified as Class A dams rather than Class C dams.

Response: The Department concludes that waste disposal dams cannot meet the definition of a Class A dam. Classification is based upon hazard potential and the materials impounded by a waste disposal dam increase the hazard potential of such a dam above the Class A criteria. Thus, waste disposal dams will be assigned a Class B or Class C classification on a case-by-case basis.

Section 3.5.2.c.A

Comment: The phrase "significant environmental damage" should be defined.

Response: The phrase "significant environmental damage" has been replaced with the phrase "significant harm to the environment" (see also the Department's response to the Section 2.7.3 comment on page 3 above).

Section 3.5.3.a

Comment: "A sudden flooding of inhabited land" would not necessarily cause a loss of life; reference should instead be made to the depth and velocity of the released water.

Response: Section 3.5.3.a contains a listing of factors that potentially could result in a loss of human life; the list is neither all-inclusive nor determinative. Furthermore, it is impractical to attempt to calculate the probable depth of water released by a dam's failure for all downstream locations. Many factors, such as reservoir volume at the time of release, are variables for which accurate prediction will prove difficult. Finally, it should be noted that velocity is already referenced in this subsection.

Section 3.5.3.b

Comment: A downstream breach analysis may not be necessary in all cases.

Response: The Department agrees that a downstream breach analysis may not be necessary in certain, rather special cases where existing conditions prevent future downstream development and has therefore amended the regulations through the addition of a new Section 3.5.3.b.A to provide a waiver for such cases.

Section 4.6

Comment: One commenter objects to the broadness of this provision and asks the Department to add a waiver clause to this section which would exclude activities that impound small amounts of water, either temporarily or permanently, on a regular basis.

Response: The requested waiver clause has been added to the regulations in a new Section 4.6.1.

Section 6.4.4.b

Comment: One commenter states that portions of West Virginia have not yet been mapped on the 7-1/2 minute scale. Therefore, the Department should allow for the use of 15 minute scale maps in areas not yet mapped at the 7-1/2 minute scale.

Response: The commenter is mistaken; 7-1/2 minute United States Geological Survey topographic maps are available for all areas in West Virginia.

Section 6.4.4.c

Comment: The word "visible" should be inserted into the second sentence of this subsection as follows: "The location of visible spring, seeps..."

Response: The Department disagrees with the commenter; the term "visible" is not an appropriate qualifier in this provision.

Section 6.4.4.e

Comment: Additional cross-sections of critical areas should not be required in the plan package submittal; rather, corrections to eliminate critical area problems should be required during construction.

Response: The Department has amended the second sentence of this subsection to read as follows: "Additional cross-sections of critical areas, such as curves and weak areas, may be required by the director."

Section 6.4.5

Comment: An environmental inventory should only be required for new dams and for major modifications to existing dams which might alter the environmental regime or flood new areas.

Response: The Department agrees with the commenter and has revised this subsection accordingly (see Section 6.4.5.a). Additional revisions have been made in order to reflect the need to identify sites that are protected under State law (i.e., caves, cemeteries, and historic sites) or federal law (i.e., endangered and threatened species of wildlife). This increased specificity will result in a more abbreviated and focussed inventory that can be produced at a lower cost to the applicant than the more extensive environmental inventory originally proposed.

Section 7.1.2.a.C

Comment: The following should be added to this subsection: "Vegetated earth and unlined earth spillways shall be designed to operate no more frequently than once in 50 years based on a 6-hour rainfall event."

Response: The Department has amended this sentence as recommended by the commenter with one exception. The spillway operation frequencies for each class of dam have been retained as originally proposed by the Department.

Section 7.1.2.a.D

Comment: The following should be added to this subsection: "Dams designed to overtop shall be designed to operate no more frequently than once in 100 years based on a 6-hour rainfall event."

Response: The Department agrees with the commenter in part and will add the phrase "based upon a 6-hour rainfall event" to the end of this subsection.

Section 7.2.2.b.A

Comment: The provisions of this subsection should not apply to pipes designed for non-pressure flow.

Response: The comment is a non sequitur; non-pressure flow through pipes does not entail any transition from partial to full pipe conditions because non-pressure flow is partial flow.

Section 7.3.1.a

Comment: The word "visible" should be inserted into the second sentence of this subsection as follows: "The survey shall locate all visible test pits, borings..."

Response: The use of the qualifier "visible" is inappropriate in this provision.

Section 7.4.1.a.A

Comment: The specifications for acceptable earth materials are too restrictive. For example, buttress material for embankment stability might contain some organic matter or be non-durable rock and still serve its intended purpose with no ill effect.

Response: The Department disagrees with the commenter; the criteria for acceptable earth material contained in this subsection are necessary to insure long-term structural stability.

Section 7.4.2.a.A

Comment: The third sentence of this subsection should be amended to read as follows: "Pertinent testing of engineering properties such as, but not limited to, density, shear strength, liquid and plastic limits, and optimum moisture content shall be made on the selected material."

Response: The Department has amended this sentence to read as follows: "Unless otherwise approved by the director, the selected material must be thoroughly tested for density, shear strength, liquid and plastic limits, and optimum moisture content."

Section 7.4.2.a.B.(a)(C)

Comment: This subsection should be deleted and replaced by the following: "The material used in the filter shall meet West Virginia Department of Highways Specifications (1986), Sections 702 and 703, as applicable."

Response: The requested revision is denied. The Department of Highways Specifications speak of the use of certain aggregates, in particular crushed slag, which are inappropriate to the design of filters. Furthermore, the requested revision would remove the ability of the engineer to design the most approporiate filter for a given project.

Section 7.4.2.a.B.(a)(E)

Comment: This subsection should be deleted because it effectively prohibits the use of geotextile filter fabric in embankment and foundation drains.

Response: The Department does not believe that geotextile filter fabric has been in use for a long enough period of time to have been proven to be able to function throughout the life of a dam. However, it should be noted that the provisions of this subsection do not prohibit the use of geotextile filter materials in areas where access will exist to allow replacement of the geotextile material during the operating life of the dam should the material fail to perform properly.

Section 7.4.2.a.C.(a)(D)

Comment: One commenter notes that the term "seismic safety factor" has not been defined in these regulations and adds: "If this is the pseudo-seismic analysis normally required by many agencies, it has no engineering basis!"

Response: The Department has revised this subsection to allow site-specific evaluations of earthquake effects using the most appropriate analysis.

Section 7.4.2.a.C.(c)

Comment: One commenter writes:

> This section makes no sense. The analysis water level should be taken as the maximum compatible with the dam's design. This, in general, has no relationship to the elevation of the emergency spillway crest. It could be anywhere from normal pool to the top of dam elevation, depending on materials permeability, time for drawdown, etc.

Response: The Department disagrees with the commenter. Embankment loading conditions require the reservoir to be at the emergency spillway elevation with a developed long-term, steady-state phreatic surface. Assuming the usual earthen dam with principal spillway pipe and emergency spillway channel, the loading conditions specified in this subsection of the regulations are necessary for the following reasons:

1. One conceivable scenerio involves malfunction or blockage of the principal spillway pipe. The reservoir will rise to the emergency spillway crest and remain there until repairs are effected. The dam must remain stable under this particular loading condition.

2. Emergency spillway channels have a much greater flow capacity than principal spillway pipes. Under design storm conditions, the reservoir will rise to its maximum design elevation with both spillways operating at design capacity. The reservoir will drop to the elevation of the emergency spillway crest quickly after the storm event ends due to the high flow capacity of the channel. The reservoir will slowly decrease in elevation from this point due to the relatively low capacity of the principal spillway pipe. The dam must remain stable under these relatively long-term, high reservoir elevation conditions based upon a water surface at the emergency spillway elevation.

3. For dams without spillways (e.g., waste disposal dams), the loading condition specifies a long-term water level at the maximum design pool elevation. This condition assumes that the

maximum design storm has occurred and the water level is at its maximum until reduced by pumping or other means. The dam must remain stable under this particular condition.

Section 7.4.2.a.D.(a)

Comment: Soil cover must not be placed on rock-covered embankments with equipment which could break the rock.

Response: The Department agrees with the commenter and has amended the last sentence of this subsection to read as follows: "The rock cover may be covered with soil and vegetated, provided that the equipment used to place the soil will not break the rock."

Section 7.4.2.d.A.(a)

Comment: This subsection should be amended to allow for the use of corrugated metal pipe in instances where such pipe is the best design alternative (e.g., low head culvert spillways).

Response: Corrugated metal pipes are not suitable for use under pressure flows because the pipe joints will leak. Furthermore, the Department does not believe that corrugated metal pipes are appropriate for use in low head culvert spillways as suggested by the commenter. Corrugated metal pipe has a useful life of approximately twenty years; in contrast, the operating life of a dam may be one hundred or more years. Replacement of suspect corrugated metal pipes used in low head culvert spillway applications would require excavation, an expensive operation which the dam owner may be inclined to forego to the detriment of proper spillway operations.

Notwithstanding the unsuitability of corrugated metal pipe, the Department recognizes that many dams in this state do contain corrugated metal pipes. Therefore, a new Section 7.4.2.d.A.(a)(A) has been added to the regulations in order to provide for the continued use of corrugated metal pipes in dams constructed prior to the effective date of these regulations. Such use may continue until the pipes leak, deteriorate, or otherwise cease to function properly.

Section 7.4.2.d.A.(c)

Comment: This subsection should be modified to allow the use of a stop log design.

Response: The Department disagrees with the commenter and will not revise the provisions of this subsection. A stop log is not a gate.

Section 8.1.1.b

Comment: The principal contact person may be located at a corporate office rather than at the project area. This subsection should therefore be amended as follows: "The name, address, and telephone number of the owner's principal contact person ~~at--the project--area~~ who is responsible for communicating with the staff of the Department's Dam Control Office and for receiving inspection reports and legal notifications."

Response: The requested revision is not acceptable. The Department feels that it is reasonable to expect one individual at the project site to be a responsible agent for the owner.

Section 8.1.13.b.B

Comment: The last sentence in this subsection should be amended as follows: "All sediment ponds, barriers, and traps must be restored to design capacity after each rainfall or other sediment-producing activity causing significant decrease in design capacity of the sediment control device."

Response: This subsection has been modified in order to address the commenter's concern.

Section 8.1.13.b.C

Comment: The three-week time period in this subsection should be extended to six weeks.

Response: Three weeks is the standard period of time allowed before seeding and mulching must begin, as set forth in the U.S. Soil Conservation Service's "Erosion and Sediment Control Handbook for Developing Areas (West Virginia)."

Section 8.1.13.b.E

Comment: The prohibition on in-stream treatment under this subsection should not include sedimentation ponds.

Response: This subsection has been modified in order to address the commenter's concern.

Section 8.1.14.b.A

Comment: This subsection should be modified to allow the return of excess materials to the original borrow source areas rather than requiring their placement in an approved waste disposal area.

Response: An applicant for a certificate of approval may choose to delineate in his plan package submittal that borrow areas are to serve as waste disposal areas.

Section 8.2.1

Comment: The third sentence of this subsection should be amended to read as follows: "Critical phases of construction shall be monitored by the engineer or his designated representative constantly;..."

Response: The Department accepts the commenter's suggestion and has amended this subsection accordingly.

Section 13

Comment: The requirement that the owner of a dam completed before July 1, 1973 obtain a certificate of approval to operate that dam is inconsistent with the provisions of Section 4.1 whereby such certificates are necessary in order to "place, construct, enlarge, alter, breach, remove, abandon, or perform major repairs upon any dam." Moreover, the definition of "certificate of approval" in Section 2.4 does not include the term "operation." Therefore, Section 13 should be deleted because, if imposed, the provisions of this section could cause expensive, unwarranted modifications to dams which were constructed in accordance with accepted standards at the time of their placement.

Response: The certification requirements of Section 13 do not conflict with the provisions of Section 4.1 or the definition that appears in Section 2.4 of the regulations. Contrary to the commenter's assertion, the term "operation" is not the key to the provisions in Section 13; in fact, this term does not appear in the section.

The rationale for Section 13 of these regulations is found in Section 11 of the Dam Control Act: "The director shall give notice to file an application for a certificate of approval to every owner of a dam which was completed prior to the effective date of this section (April 3, 1982)..." The Dam Control Act requires the certification of all dams, including those completed prior to July 1, 1973. Thus, Section 13 compliments, rather than conflicts with, Section 4.1 in order to fulfill this statutory mandate.

Section 15.3.1

Comment: The phrase "provided that such emergency release will not pose a hazard to human life" should be deleted from this subsection. Severe weather conditions, such as the November 1985

flood, necessitate a choice between either an emergency release of water that may pose a threat to life and property by its sheer volume or the possible failure of the dam if such a release does not occur.

Response: The Department recognizes the ramifications of the dilemma cited by the commenter but believes the apparent conflict is an artificial one. The dilemma described by the commenter need not be a balancing of risks between choices which inherently pose a threat to human life. Rather, the dilemma is resolved through the proper notification of downstream residents in accordance with Section 15.8.1 of these regulations.

By both statute and regulation, the owner of a dam is responsible for the immediate notification of any person who may be endangered if his dam should fail. Furthermore, the owner must then take any remedial action, such as an emergency release of water, necessary to protect life and property. The proviso which the commenter questions was not intended by the Department to impede a dam owner's ability to release water to alleviate an emergency condition. However, to avoid future confusion, the Department has amended this subsection as follows:

> 15.3.1. Emergency Releases of Water. Under emergency conditions, the owner of a dam may release water at a rate which may violate the criteria established under Section 15.3 of these regulations provided that such emergency release will not pose an unjustifiable hazard to human life. Notification must be given of a pending emergency release of water in accordance with the provisions of Section 15.8.1 of these regulations. In accordance with the provisions of W. Va. Code §20-5D-13, this regulatory provision shall not relieve the owner of the dam of any liabilities resulting from an emergency release of water.

Section 15.3.2

Comment: One commenter objects to this provision, stating that the imposition of required low flow augmentation could negatively impact his power generating abilities. The commenter argues that this provision conflicts with his riparian rights granted under common law:

> Under West Virginia law, one is allowed to use the water flowing by his property without restriction on amount (at least so long as he was there first). Thus, we request this proposed right of the Director to augment the downstream flow be deleted so that the ordinary common law of West Virginia on riparian rights will govern the consumption and flow of water.

Response: The commenter has presented an erroneous interpretation of the common law doctrine of riparian rights. The commenter has no right under common law, as applied in West Virginia, to use water flowing by his property without restriction.

Under the riparian system that prevails in this state, the right to use the waters of a stream arises from the ownership of the land bordering that stream. All riparian proprietors on a stream have an equal right to the reasonable use of the water. That is, each proprietor's right to use the waters of a stream must be tempered by the right of every other proprietor to the use of those waters without material diminution in flow or purity.

The commenter's statement, on the other hand, more closely reflects the appropriation system of water law prevalent west of the Mississippi River. Under the appropriation system, the first person to make beneficial use of the waters of a stream gains the right to an unrestricted allocation of those waters (i.e., priority of appropriation confers priority of right).

In contrast to the appropriation system, the doctrine of riparian rights embraces two established yet somewhat different principles of allocation. Both of these principles have a direct bearing upon the commenter's assertions. The principle of natural flow holds that no riparian owner may affect the flow of a stream in a manner that impairs or diminishes that flow to the detriment of a downstream riparian owner. The principle of reasonable use holds that each riparian owner may make reasonable use of the waters of the stream so long as the needs of other riparian owners are duly considered. Thus, a riparian owner's use of a stream is subject to certain limitations, among which is the preservation of the general volume of the stream for the downstream riparian owners.

Not only has the commenter incorrectly interpreted West Virginia common law, he has also ignored the application of West Virginia statutory law. Statutory law -- law created by the enactment of a legislature -- can modify or prevail over common law. In the case at hand, statutory law does address the use of the waters of this state. The West Virginia Legislature set forth the State's water resources policy in W. Va. Code §20-5-1a: "It is declared to be the public policy of this state that the water resources of this state with respect to the quantity thereof shall be available for reasonable use by all of the citizens of this state."

Both statutory and common law oppose the commenter's position regarding the use of the waters flowing by his property. The Director of the Department of Natural Resources has legitimate cause and authority to impose low flow augmentation under these regulations in order to fulfill the declared water resources policy of this State. In times of drought, low flow augmentation may be necessary to preserve the rights held both by the riparian

proprietors downstream from the commenter's dam and by the citizens of this state to the use and enjoyment of the waters of the State.

Section 15.5.1

Comment: The term "major storm" in the third sentence of this subsection should be replaced by the phrase "a storm equal to or greater than a 50-year, 6-hour rainfall event."

Response: The Department agrees with the commenter and has revised this subsection accordingly.

Section 15.8.1

Comment: This subsection should be amended to read as follows: "If the owner of a dam determines that an emergency exists, in accordance with the provisions of W. Va. Code §20-5D-10, it is his responsibility ~~to notify any persons who may be endangered if the dam should fail~~ to insure that the emergency warning plans provide for the notification of any persons who may be endangered if the dam should fail.

Response: Section 10 of the Dam Control Act requires each dam owner to notify all persons who may be endangered during emergency conditions, not merely to plan for the provision of such a notification as suggested by the commenter. As stated in the first paragraph of W. Va. Code §20-5D-10: "The owner of a dam shall have primary responsibility for determining when an emergency involving his dam exists. When the owner of a dam determines such emergency does exist, he shall notify the director and shall notify any persons who may be endangered if the dam should fail."

Section 16.1.2

Comment: One commenter asks that this subsection be deleted. He asserts that the required development of a dam maintenance plan "that is not based on actual site conditions is inappropriate due to the various site-specific aspects that can drastically alter a prescribed maintenance timetable."

Response: The last sentence of this subsection already provides the flexibility sought by the commenter: "The maintenance plan shall be updated periodically as necessary to reflect changing site conditions."

Section 16.2.4

Comment: The phrase "if necessary" should be added to the end of this provision.

Response: The repair of leaks in a spillway channel is not a matter of discretion -- all leakage must be immediately repaired.

Section 16.3.3

Comment: This subsection should be amended to read as follows: "If erosion on the embankment face or abutments occurs, which in the opinion of the engineers affects the integrity of the dam, then the area shall be regraded and be provided with adequate drainage control or revegetation to prevent future occurrences."

Response: The requested amendment would allow an engineer to delay the implementation of erosion control measures until dam integrity is compromised. The Department believes that control measures should instead be undertaken as soon as erosion begins to occur in order to prevent problems which, in time, could affect the integrity of a dam.

Section 16.3.4

Comment: The second sentence of this subsection should be deleted and replaced by the following sentence: "When recommended by the safety engineer and approved by the director, all cracks located in concrete channels shall be sealed with an approved sealant."

Response: The requested revision would provide a dam owner with the discretion to declare that a crack was not a problem. The granting of such discretion to the dam owner or his engineer is neither prudent nor acceptable.

General Comments

Comment: One commenter asks the Department to add a clause to these regulations allowing for a general waiver of regulatory provisions. The commenter writes:

> A very good effort has been given to provide rules and regulations to cover a very diverse subject and variety of conditions. However, because the subject is so diverse, it is impossible to develop requirements for all circumstances and eventualities. This fact should be given explicit expression in the regulations. In effect, a "variance clause" should be provided so that unusual circumstances do not allow restrictive regulations to trap

the engineer or the Director. A statement such as the following might be used:

> Because variations in conditions, new developments, and factors which might not be foreseeable, it is realized that instances may arise which will require deviation from or modification of these regulations. The Director will entertain requests for such deviations or modifications when site (or near-site) specific conditions, innovative designs or materials (within the limitations of Section 6.3.2), or other considerations imply that deviations or modifications may be beneficial. For these same reasons, the Director may find it necessary to impose requirements not cited in these regulations.

Response: The use of a general waiver or variance clause, as sought by the commenter, is not appropriate in state agency rule-making. The intent of state agency rule-making is to apply a coherent set of requirements uniformly to all members of the regulated community. State agency rules are, by definition, of general application, directed at all persons similarly situtated.

Only for good cause and within specific limitations may the regulatory provisions contained in state agency rules be waived or modified by the rule-making authority. The availability of such "variances" must be clearly set forth in specific regulatory provisions rather than in the form of a blanket waiver of requirements. Furthermore, contrary to the commenter's final suggestion, laws governing state agency rule-making prohibit the the rule-making authority from imposing regulatory requirements that are not set forth in duly promulgated rules.

In the case of the Department's Dam Control Regulations, waivers of or modifications to specific regulatory provisions may be granted by the Director. A number of the requirements set forth in these regulations can be so waived or modified. For example, the dam location prohibitions in Section 3.5.3.c may be waived based on site-specific conditions. Under the provisions of Section 6.4, an alternative plan package submission format may be approved by the Director. Of particular pertinence to the comment above, approved dam construction plans and design specifications can be modified during construction under the provisions of Section 8.4 of the regulations.

Contrary to the commenter's assertion regarding the restrictiveness of the Department's regulations, every effort has been made to accommodate new technologies. For example, Section 6.3.2 of the regulations allows innovative or experimental designs to be employed by dam owner and his engineer. Nevertheless, the central purpose of the Department's Dam Control Regulations is the protection of life and property through the use of standard, accepted, and sound engineering practices.

TITLE 47
LEGISLATIVE RULES
DEPARTMENT OF NATURAL RESOURCES

SERIES 34
DAM CONTROL REGULATIONS

SECTION	TITLE	PAGE
1	**GENERAL.**	
1.1.	Scope and Purpose	1
1.2.	Authority	1
1.3.	Filing Date	1
1.4.	Effective Date	1
1.5.	Repeal of Former Rule	1
2	**DEFINITIONS.**	
2.1.	"Abandonment"	1
2.2.	"Appurtenances"	1
2.3.	"Bridge"	1
2.4.	"Certificate of Approval"	1
2.5.	"Channel Protection"	2
2.6.	"Dam"	2
2.7.	"Dangerous Condition"	2
2.8.	"Department"	2
2.9.	"Design Storm"	3
2.10.	"Director"	3
2.11.	"Diversion Ditch"	3
2.12.	"Embankment"	3
2.13.	"Emergency Condition"	3
2.14.	"Emergency Spillway"	3
2.15.	"Engineer"	3
2.16.	"Freeboard"	3
2.17.	"Geotechnical Engineering"	3
2.18.	"Hazard Classification"	3
2.19.	"Hydraulics"	3
2.20.	"Hydrologic Analysis"	4
2.21.	"Hydrology"	4
2.22.	"Impoundment"	4
2.23.	"Incised Reservoir"	4
2.24.	"Natural Bed"	4
2.25.	"Natural Drainway"	4
2.26.	"P100"	4
2.27.	"Piping"	4
2.28.	"Primary Highway"	4
2.29.	"Principal Spillway"	4

SECTION	TITLE	PAGE
2.30.	"Probable Maximum Precipitation" or "PMP"	4
2.31.	"Project Area"	4
2.32.	"Roadfill"	4
2.33.	"Safety Factor" or "Factor of Safety"	5
2.34.	"Secondary Highway"	5
2.35.	"Sediment"	5
2.36.	"Serious Problem"	5
2.37.	"Significant Harm to the Environment	5
2.38.	"Site"	5
2.39.	"Subsidence"	5
3	**CLASSIFICATION OF DAMS.**	
3.1.	Types of Dams	5
3.2.	Dam-Related Measurements	6
3.3.	Dams in Series	6
3.4.	Incidental Dams	7
3.5.	Classification of Dams	7
4	**CERTIFICATES OF APPROVAL.**	
4.1.	Certificate Required	9
4.2.	Certificate Issuance	9
4.3.	Hearings Prior to Certificate Issuance	10
4.4.	Certificate Revocation or Suspension	10
4.5.	Certificate Terms and Conditions	10
4.6.	Approval to Impound Water	10
4.7.	Other Approvals	10
5	**APPLICATION PROCEDURES.**	
5.1.	Application Preparation and Submission	11
5.2.	Application Review	12
6	**PLANS AND SPECIFICATIONS.**	
6.1.	Plans and Specifications	12
6.2.	Engineer's Signature and Seal Required	12
6.3.	Engineering Practices	12
6.4.	Plan Package Organization	13

SECTION	TITLE	PAGE
7	**DESIGN REQUIREMENTS.**	
7.1.	Hydrologic Considerations	19
7.2.	Hydraulic Considerations	22
7.3.	Geotechnical Considerations	23
7.4.	Structural Considerations	25
7.5.	Miscellaneous Considerations	32
8	**CONSTRUCTION OR MODIFICATION OF A DAM.**	
8.1.	Construction Requirements	32
8.2.	Quality Control	38
8.3.	Construction Inspections	40
8.4.	Construction Reporting Requirements	41
9	**BREACHING OF A DAM.**	
9.1.	Application to Breach a Dam	41
9.2.	Breach Dimensions	42
9.3.	Breach Channel	42
9.4.	Safety	42
9.5.	Blasting	42
9.6.	Erosion and Sediment Control	42
9.7.	Placement of Earthen Material	43
9.8.	Placement of Non-Earthen Material	43
9.9.	Galleries and Drains	43
9.10.	Safety of Remaining Structure	43
9.11.	Construction Practices	43
10	**REMOVAL OF A DAM.**	
10.1.	Application to Remove a Dam	43
10.2.	Removal Requirements	44
10.3.	Safety	44
10.4.	Blasting	44
10.5.	Erosion and Sediment Control	44
10.6.	Placement of Earthen Material	44
10.7.	Placement of Non-Earthen Material	45
10.8.	Safety of Remaining Structure	45
10.9.	Construction Practices	45

SECTION	TITLE	PAGE
11	**ABANDONMENT OF A DAM.**	
11.1.	Application to Abandon a Dam	45
11.2.	Reservoir Elimination	45
11.3.	Embankment Stability	45
11.4.	Diversion System	45
11.5.	Sealing Conduits	45
11.6.	Erosion and Sediment Control	46
11.7.	Soil and Vegetative Cover	46
11.8.	Retention of Jurisdiction	46
11.9.	Final Approval of Abandonment	46
12	**REDUCTION OR ENLARGEMENT OF A DAM.**	
12.1.	Reduction of Dam Height to Less Than Jurisdiction	46
12.2.	Enlargement of a Structure to Jurisdiction	47
13	**DAMS COMPLETED BEFORE JULY 1, 1973.**	
13.1.	Complete Application Required	48
13.2.	Performance Requirements	48
13.3.	Plan Package Requirements	48
14	**SALE OR TRANSFER OF A DAM.**	
14.1.	Notification and Documentation	48
15	**DAM OPERATIONS AND SAFETY.**	
15.1.	Safe Operations	49
15.2.	Operations Plan	49
15.3.	Releasing Water	49
15.4.	Dam Safety Inspections	50
15.5.	Dam Safety Inspection Reports	51
15.6.	Monitoring Plans	51
15.7.	Emergency Action Plans	52
15.8.	Emergency Procedures	52
15.9.	Dam Owner Not Relieved of Responsibility	53

SECTION	TITLE	PAGE
16	**DAM MAINTENANCE.**	
16.1.	General Maintenance Requirements	53
16.2.	Specific Maintenance Requirements	54
16.3.	Routine Maintenance	54
17	**DAM REPAIRS.**	
17.1.	General Repair Requirements	55
17.2.	Specific Repair Requirements	55

TITLE 47
LEGISLATIVE RULES
DEPARTMENT OF NATURAL RESOURCES

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SECRETARY OF STATE

SERIES 34
DAM CONTROL REGULATIONS

§47-34-1. General.

1.1. Scope and Purpose. -- This legislative rule establishes requirements relating to the design, placement, construction, enlargement, alteration, removal, abandonment, and repair of dams in this State that fall within the definition set forth in Section 2.6 of these regulations.

1.2. Authority. -- W. Va. Code §20-5D-4.

1.3. Filing Date. --

1.4. Effective Date. --

1.5. Repeal of Former Rule. -- This legislative rule repeals and replaces 47 C.S.R. 32 "Dam Control" that was filed on December 30, 1982 and became effective on January 1, 1983.

§47-34-2. Definitions.

2.1. "Abandonment" means to render a dam non-impounding by filling the reservoir created by that dam with solid materials and by diverting the natural drainway around the site.

2.2. "Appurtenances" means any ancillary part of a dam or reservoir system which contributes to the operation or construction of the dam.

2.3. "Bridge" means a structure, including any abutments or supports appurtenant to that structure, which:

2.3.1. Meets the definition of "dam" set forth in Section 2.6 of these regulations;

2.3.2. Is constructed across a natural drainway for the purpose of maintaining a pathway, railway, roadway, support structure, or other passageway for transporting persons, traffic, or other static or moving loads; and

2.3.3. Has an opening under the structure to provide for the passage of normal stream flow.

2.4. "Certificate of Approval" means the approval in writing issued by the director to a person who has applied for certification authorizing such person to place, construct,

enlarge, alter, remove, abandon, or repair a dam and which specifies the conditions or limitations under which such work is to be performed by the applicant.

2.5. "Channel Protection" means any measure taken to prevent or control erosion, cavitation, or other destructive processes in channels such as diversion ditches and spillways.

2.6. "Dam" means an artificial barrier or obstruction -- including any works appurtenant to it and any reservoir created by it -- which is or will be placed, constructed, enlarged, altered, or repaired so that it does or will impound or divert water and is or will be twenty-five (25) feet or more in height from the natural bed of a stream or watercourse measured at the downstream toe of the barrier and which does or can impound fifteen (15) acre-feet or more of water or is or will be six (6) feet or more in height from the natural bed of such stream or watercourse measured at the downstream toe of the barrier and which does or can impound fifty (50) acre-feet or more of water. The term "dam" does not include:

2.6.1. Any dam owned by the federal government;

2.6.2. Any dam for which the operation and maintenance thereof is the responsibility of the federal government;

2.6.3. Any slack water dam constructed and maintained in connection with public highways, streets, bridges, culverts, or viaducts;

2.6.4. Any farm pond constructed and used primarily for agricultural purposes -- including, but not limited, to livestock watering, irrigation, retention of animal wastes, and fish culture -- which has no potential to cause a loss of human life in the event of embankment failure; and

2.6.5. Any dam associated with the exploration, development, production, storage, or recovery of coal, oil, natural gas, or other mineral resources and under the jurisdiction of the West Virginia Department of Energy pursuant to W. Va. Code §22-1-16.

2.7. "Dangerous Condition" means any structural or hydraulic condition of a dam or its appurtenances which may lead to:

2.7.1. Failure of the dam and possible loss of human life or substantial loss of property;

2.7.2. Harm to the public health or welfare; or

2.7.3. Significant harm to the environment.

2.8. "Department" means the West Virginia Department of Natural Resources.

2.9. "Design Storm" means predicted precipitation of given intensity, frequency, and duration based upon National Weather Service data that is required to be considered in the design of a dam.

2.10. "Director" means the director of the West Virginia Department of Natural Resources or his authorized agents.

2.11. "Diversion Ditch" means a designed channel constructed for the purpose of collecting and transmitting surface runoff resulting from a given design storm.

2.12. "Embankment" means a constructed deposit of earth or waste materials, usually exhibiting at least one sloping face.

2.13. "Emergency Condition" means an imminently dangerous condition where failure of the dam is possible at any time.

2.14. "Emergency Spillway" means a hydraulic structure designed to discharge water in excess of that which an impoundment is designed to store or which cannot be passed through a principal spillway.

2.15. "Engineer" or "Registered Professional Engineer" means a person who by reason of his knowledge of mathematics, the physical sciences, and the principles of engineering, acquired by professional education and practical experience, is qualified to engage in the practice of professional engineering and holds a current certificate of registration issued by the State granting its licensee the privilege of practicing professional engineering in accordance with the provisions of W. Va. Code §30-13.

2.16. "Freeboard" means the vertical distance between the lowest point of the crest of the embankment of a dam and the reservoir water surface.

2.17. "Geotechnical Engineering" means the application of soil mechanics, rock mechanics, and geology to the solution of problems involving engineering structures and their interaction with surrounding earth materials.

2.18. "Hazard Classification" means a classification rating assigned to a structure based upon engineering evaluations and judgments for predicting the danger to human life, property, and environment should a failure of the structure occur.

2.19. "Hydraulics" means the study of the physical behavior of liquids, especially water, in natural or man-made systems or processes.

2.20. "Hydrologic Analysis" means a determination, using accepted engineering methods, to establish surface water runoff for a given design storm.

2.21. "Hydrology" means the science that deals with the occurrence and behavior of water in the atmosphere, on the ground, and underground.

2.22. "Impoundment" means a basin for the retention of water, sediment, or waste.

2.23. "Incised Reservoir" means an impoundment, or that portion of an impoundment, which has been excavated below the natural stream level into natural ground.

2.24. "Natural Bed" means the lowest elevation of a stream, intermittent stream, or channel created by nature which has not been altered or changed by the actions of man.

2.25. "Natural Drainway" means any natural watercourse which may carry water to the tributaries and rivers of the watershed.

2.26. "P100" means the rainfall amount based upon a one hundred (100) year frequency, six (6) hour duration rainfall event (i.e, a 100-year, 6-hour storm).

2.27. "Piping" means progressive internal erosion of earth material caused by water movement through embankment material with sufficient force to move soil particles, leading to the development of a channel or a hole.

2.28. "Primary Highway" means those roadways which are designated as interstate routes, United States numbered routes, or West Virginia numbered routes.

2.29. "Principal Spillway" means the hydraulic structure designed to discharge water stored between the normal pool and the emergency spillway invert elevations.

2.30. "Probable Maximum Precipitation" or "PMP" means the depth-duration-area rainfall event for a particular area that represents the maximization of the most critical meteorological conditions that are considered possible to occur.

2.31. "Project Area" means all areas physically affected by the construction of a dam including, but not limited to, the dam and its appurtenances, the reservoir area, construction zones, permanent or temporary access roads, borrow areas, materials storage areas, staging areas, and waste disposal areas.

2.32. "Roadfill" means a barrier or obstruction which:

2.32.1. Meets the definition of "dam" set forth in Section 2.6 of these regulations;

2.32.2. Is constructed across a natural drainway for the purpose of maintaining a roadway or similar crossing across that drainway; and

2.32.3. Has a culvert located in the drainway that is of sufficent size to prevent the normal impoundment of water.

~~2.33. "Safety Factor" or "Factor of Safety" means the ratio of the available shear strength to the developed shear stress, or ratio of the sum of the resisting forces to the sum of the loading or driving forces, as determined by accepted engineering practices.~~

2.33. "Safety Factor" or "Factor of Safety" means the ratio of the sum of the forces or moments resisting mass movement to the sum of the forces or moments tending to produce mass movement.

2.34. "Secondary Highway" means those roadways which are designated by the West Virginia Department of Highways as county numbered routes.

2.35. "Sediment" means solid material, either mineral or organic, resulting from the works of man that has been moved from its site of origin by water.

2.36. "Serious Problem" means a situation which left uncorrected may lead to a dangerous condition.

2.37. "Significant Harm to the Environment" means the degradation of a public or private surface water supply, the alteration of habitat that adversely affects wildlife, or the reduction of the productivity of agricultural land.

~~2.37.~~ 2.38. "Site" means the permanent location of a dam, including the dam and its appurtenances, the reservoir area, diversion ditches, and sediment control facilities.

~~2.38.~~ 2.39. "Subsidence" means a sinking, collapsing, or cracking of a portion of the earth's surface resulting from the presence of a void or voids beneath the surface.

§47-34-3. Classification of Dams.

3.1. Types of Dams.

3.1.1. For the purpose of these regulations, dams are divided into three general types:

3.1.1.a. Embankment Dams. Embankment dams are usually constructed of materials which exhibit rock-like or soil-like properties.

3.1.1.b. Gravity Dams. Gravity dams are usually constructed of concrete or masonry materials which form a rigid body.

3.1.1.c. Waste Disposal Dams. Waste disposal dams are usually constructed of waste materials such as fly ash or coal refuse. The reservoir is utilized to dispose of waste material, thereby creating a continuously decreasing freeboard condition.

3.1.2. In cases where a dam exhibits properties of more than one type, such as gabion structures or roller-compacted concrete, design techniques must be applied which are reasonably applicable to the particular structure involved.

3.2. Dam-Related Measurements.

3.2.1. Measuring Dam Height. The height of a dam is measured from the crest or uppermost point on the dam to the lowest point in the natural bed of the stream or watercourse at the downstream toe of the dam. Gravity overflow dams must be measured to the highest level which is greater than ten percent (10%) of the total crest length of the dam. The height of dams with sloping crests shall be determined by a weighted-average height above the natural bed of the stream or watercourse, excluding spillways.

3.2.2. Measuring Reservoir Volume. For purposes of determining whether a dam meets the criteria set forth in Section 2.6 of these regulations as applied to reservoir volume calculations, the volume must be calculated at the crest elevation of the dam that is equivalent to the elevation used in determining the dam height.

3.2.3. Incised Reservoirs. The height of the embankment of an incised reservoir must be measured using the method set forth in Section 3.2.1 of these regulations. Reservoir volume must be calculated from the crest of the embankment to the elevation of the lowest point in the natural bed of the stream or watercourse at the downstream toe. That portion of the water stored below stream grade shall not be included in determining whether a dam meets the criteria set forth in Section 2.6 of these regulations; however, it must be reported in the application as part of the total reservoir volume.

3.3. Dams in Series. If the director determines that a series or combination of water-impounding structures within the same watercourse, or within the tributaries of such watercourse, which cumulatively meet the definition of "dam" set forth in Section 2.6 of these regulations constitute a hazard to human life, and failure of one or more of the impounding structures may induce failure of any or all of the remaining impounding structures, he may require the owner or owners of each impounding structure to comply with the requirements of these regulations.

3.4. Incidental Dams.

3.4.1. Roadfills.

3.4.1.a. If the director finds that a roadfill has become a hazard to human life or property through the frequent or continuous impoundment of water, he may order the owner of that roadfill to take all steps that are necessary to protect life or property in accordance with the emergency powers provided under W. Va. Code §20-5D-10.

3.4.1.b. A certificate of approval will not be required for roadfills.

3.4.2. Bridges.

3.4.2.a. If the director finds that a bridge has become a hazard to human life or property through the frequent or continuous impoundment of water, he may order the owner of that bridge to take all steps that are necessary to protect life or property in accordance with the emergency powers provided under W. Va. Code §20-5D-10.

3.4.2.b. A certificate of approval will not be required for bridges.

3.4.3. Diversions. A certificate of approval will be required for dikes or other structures used to divert water and otherwise meeting the definition of "dam" set forth in Section 2.6 of these regulations.

3.4.4. Stream Encroachments. If the director finds that a natural drainway has been restricted by filling or other artificial means so that the restriction can or does impound water, and the fill and resulting reservoir meets the height and storage requirements of a "dam" as defined in these regulations, he may order the fill removed or require a certificate of approval or both.

3.5. Classification of Dams. The applicant for a certificate of approval must propose the hazard classification for his dam based upon the classification guidelines listed in Section 3.5.2 of these regulations and the hazard evaluation performed pursuant to Section 3.5.3 of these regulations. The classification proposed by an applicant is subject to approval by the director.

3.5.1. Changes in Dam Classification. The director will periodically review the hazard classification of each dam subject to these regulations and may reclassify a dam if he determines that the hazard potential has changed.

3.5.2. Hazard Classifications.

3.5.2.a. Class A Dams. Class A dams are those dams located in rural or agricultural areas where failure may damage nonresidential and normally unoccupied buildings, rural or agricultural land, or secondary highways. Failure of a Class A dam would cause only a loss of the dam itself and a loss of property use, such as use of related roads, with little additional damage to adjacent property. Loss of human life resulting from failure of a Class A dam must be unlikely.

3.5.2.a.A. An impoundment exceeding forty (40) feet in height or two hundred (200) acre-feet storage volume shall not be classified as a Class A dam.

3.5.2.a.B. A waste disposal dam shall not be classified as a Class A dam.

3.5.2.b. Class B Dams. Class B dams are those dams located in predominantly rural or agricultural areas where failure may damage isolated homes, primary highways, or minor railroads or may cause the interruption of public utility services. Failure of a Class B dam may cause great damage to property and project operations. Loss of human life resulting from failure of a Class B dam must be unlikely.

3.5.2.c. Class C Dams. Class C dams are those dams located where failure may cause a loss of human life or damage to homes, industrial and commercial buildings, important public utilities, primary highways, or main railroads. This classification must be used if failure may result in the loss of human life.

~~3.5.2.c.A. A waste disposal dam, the failure of which may cause significant environmental damage, shall be classified as a Class C dam.~~

3.5.2.c.A. A waste disposal dam, the failure of which may cause significant harm to the environment, shall be classified as a Class C dam.

3.5.3. Hazard Evaluation.

3.5.3.a. Downstream Hazards. In evaluating the hazard potential of a dam in order to determine its hazard classification, a complete evaluation of the downstream area which will be affected in the event of dam failure must be performed. A sudden flooding of inhabited land, a water flow with damaging velocity, a wall of water, or the flooding of inhabited structures will all be deemed to have the potential to result in a loss of human life. The planned or potential future development of downstream areas must also be considered when evaluating hazard classification.

3.5.3.b. Dam Break Analysis. A downstream breach analysis must be performed to evaluate and map the downstream inundation area under assumed normal conditions and overtopping failure conditions.

3.5.3.b.A. The director may waive the downstream breach analysis required under Section 3.5.3.b of these regulations for a Class A or Class B dam where downstream conditions prevent any future introduction of new facilities or residences that thereby change the hazard classification of the dam.

3.5.3.c. Upstream Hazards. No dam shall be constructed which, during maximum pool conditions, will flood upstream dwellings, public utilities, primary highways, or main railroads unless otherwise approved by the director based upon site-specific conditions.

3.5.4. Risk Assessment. The director may consider a risk assessment for justifying a reduced structure hazard classification based upon failure of the dam by overtopping. The applicant for a certificate of approval must demonstrate through appropriate calculations that all affected dwellings will be inundated and evacuated prior to the dam failure and that property damage and potential loss of human life resulting from the dam failure will not be significantly increased from that which occurred immediately prior to the dam failure. The director will not consider risk assessment based upon planned evacuation, probability of inhabitation, or monetary recovery of property damage.

§47-34-4. Certificates of Approval.

4.1. Certificate Required. A person must obtain a certificate of approval from the director in order to place, construct, enlarge, alter, breach, remove, abandon, or perform major repairs upon any dam in this State that falls within the definition set forth in Section 2.6 of these regulations.

4.2. Certificate Issuance.

4.2.1. Certificates of approval may constitute full and final approval of a dam or be issued for alterations or repairs, in which case such certificate may or may not constitute final approval of the dam.

4.2.2. The director will issue or refuse to issue a certificate of approval based upon the following:

4.2.2.a. The receipt of a complete application, including all applicable fees, in accordance with the provisions of Section 5.1 of these regulations;

4.2.2.b. The review of the application form and plan package for sufficiency; and

4.2.2.c. The results of any hearings held in accordance with the provisions of W. Va. Code §20-5D-7.

4.2.3. Defective applications will be returned to the applicant by certified or registered mail, return receipt requested, in order that he may correct any defect. The applicant must send a corrected application to the director within thirty (30) days of the date of the applicant's receipt of the returned application. The director may extend the thirty-day period upon the receipt of a written request from the applicant.

4.2.4. Upon the receipt of written approval from the director of the sufficiency of the application, the applicant shall immediately publish a Class I legal advertisement in a qualified newspaper, as defined in W. Va. Code §59-3-1, serving the county in which the proposed dam is to be located or in which the existing dam is located. Such notice shall include the name and address of the applicant, the location of the dam for which the application was filed, and such other information as may be specified by the director in his written approval.

~~4.3.--Hearings-Prior-to-Certificate-Issuance.----Hearings--that concern--specific--objections--to-the-issuance-of-a-certificate-of approval-will-be--conducted--in-accordance-with-the-provisions--of W.-Va.-Code-§20-5D-7.---Such--hearings--will-be-held-at-a-location and-time-set-by-the-director.~~

4.3. Hearings Prior to Certificate Issuance. Any person, as defined in W. Va. Code §20-5D-3, whose life or property may be adversely affected by the issuance of a certificate of approval shall have a right to a hearing before the director. A written request for a public hearing, detailing the specific objections to the issuance of the certificate of approval, must be sent to the director within fifteen (15) days of the publication of the Class I legal advertisement required under Section 4.2.4 of these regulations. Hearings that concern specific objections to the issuance of a certificate of approval will be conducted in accordance with the provisions of W. Va. Code §20-5D-7 at a location and time set by the director.

4.4. Certificate Revocation or Suspension. The director may revoke or suspend a certificate of approval in accordance with the provisions of W. Va. Code §20-5D-8 if he determines that a dam for which such certificate was issued constitutes a danger to life and property.

4.5. Certificate Terms and Conditions. A certificate of approval may include such terms and conditions as the director may find necessary for the construction or operation of the dam.

These terms and conditions may be amended by the director in accordance with the provisions of W. Va. Code §20-5D-8.

4.6. Approval to Impound Water. No person may cause a reservoir to initially fill with water, or refill a drained reservoir, without written approval from the director.

4.6.1. Upon the receipt of a written petition from a dam owner, the director may waive or modify the refilling approval requirement of Section 4.6 of these regulations in a case where frequent draining and refilling of a reservoir is the intended purpose and normal operation of the owner's dam.

4.7. Other Approvals. The director may refuse to issue a certificate of approval or may delay issuing a certificate of approval if the applicant fails to obtain necessary approvals from State or federal agencies.

4.7.1. Waterways Under State or Federal Jurisdiction. Construction of a dam across a waterway which is under the jurisdiction of the State or federal government may require State or federal agency approval prior to issuance of a certificate of approval by the director.

4.7.2. Wetlands. Construction of a dam which may inundate, drain, or otherwise adversely affect wetlands (i.e., swamps, marshes, bogs, and similar areas) may require State and federal agency approval.

§47-34-5. Application Procedures.

5.1. Application Preparation and Submission.

5.1.1. Applications for a certificate of approval shall be prepared by or under the direct supervision of an engineer.

5.1.2. Applications shall be submitted on the forms provided by the director. Application forms must be completed in their entirety without unauthorized omissions, alterations, or additions. Applications shall be signed by the applicant and an engineer.

5.1.3. A complete application will consist of a completed and signed application form, all applicable fees, and a plan package containing the information required under Section 6.4 of these regulations.

5.1.4. Plans, reports, specifications, and design drawings shall be signed and sealed by an engineer in accordance with the provisions of Section 6.2 of these regulations.

5.2. Application Review.

5.2.1. Applications will be reviewed for sufficiency by engineers and technical specialists assigned to the Department's Dam Control Office. The review will consider the completeness and technical accuracy of the information submitted and will evaluate all engineering plans and assumptions to determine the safety of the dam.

5.2.2. Applications which are incomplete or otherwise not in compliance with the requirements of these regulations will be returned to the applicant for correction in accordance with the provisions of W. Va. Code §20-5D-7.

§47-34-6. Plans and Specifications.

6.1. Plans and Specifications. Plans and specifications relating to the design, placement, construction, enlargement, alteration, removal, abandonment, or repair of a dam must be prepared in accordance with the requirements of Sections 7 through 12 of these regulations.

6.2. Engineer's Signature and Seal Required. All plans and specifications shall be signed and sealed by an engineer. The engineer's signature and seal are required on each full-size plan sheet, even if the sheets are bound together, and are further required on the front page of any engineering report book and each unbound sheet of drawings or specifications included in appendices or pockets.

6.3. Engineering Practices. All plans and specifications for the placement, construction, enlargement, alteration, breaching, removal, abandonment, or repair of a dam shall be in the charge of an engineer.

6.3.1. Standard Practices. All engineering designs, procedures, processes, and analyses shall be based upon standard, accepted, and sound engineering practices. Practices which are questionable or difficult to prove analytically may be rejected by the director or returned for additional information.

6.3.2. Experimental Practices. Experimental design will not be approved by the director unless the experiment meets the following conditions:

6.3.2.a. Engineering analysis indicates the design is realistic and success is likely;

6.3.2.b. Failure of the experiment to perform properly will not endanger life and property or cause the failure of the dam; and

6.3.2.c. The engineer and dam owner agree to redesign and modify the experimental design if it does not perform properly.

6.4. Plan Package Organization. Each plan package submitted for approval shall contain the following information, arranged in the following order, unless an alternative submission format is approved by the director:

6.4.1. Project Narrative. A general narrative discussion of the project shall be included in the plan package to detail the following:

6.4.1.a. Existing site conditions;

6.4.1.b. Local geology and geotechnical considerations;

6.4.1.c. Design life of the dam and its appurtenances;

6.4.1.d. Subsidence potential;

6.4.1.e. Design techniques with associated design computations and data;

6.4.1.f. Environmental protection measures for the control of erosion and sedimentation and for the disposal of construction wastes;

6.4.1.g. Method of construction, including clearing and grubbing, topsoil stockpiles, and surface and subsurface drainage structures;

6.4.1.h. Phases of construction; and

6.4.1.i. Routine inspection and maintenance procedures and schedules.

6.4.2. Construction Sequence and Schedule. A proposed or recommended sequence of construction, with a schedule listing the anticipated number of working days necessary to accomplish each item in the sequence, shall be included in the plan package to cover the following general categories:

6.4.2.a. Sediment control measures;

6.4.2.b. Clearing and grubbing;

6.4.2.c. Road or utility relocations;

6.4.2.d. Development of borrow areas;

6.4.2.e. Placement of coffer dams or diversions;

6.4.2.f. Excavation of foundation areas;

6.4.2.g. Excavation of spillways;

6.4.2.h. Placement of embankment or structural materials;

6.4.2.i. Placement of spillways and appurtenances to spillways;

6.4.2.j. Seeding and mulching of the project area;

6.4.2.k. General cleanup of the project area; and

6.4.2.l. Other information as requested by the director.

6.4.3. Project Specifications. Specifications shall be included in the plan package to detail the following:

6.4.3.a. Clearing and grubbing;

6.4.3.b. Soil stockpiles;

6.4.3.c. Subdrain construction;

6.4.3.d. Slopes;

6.4.3.e. Grades;

6.4.3.f. Surface drainage structures;

6.4.3.g. Spreading and compaction requirements, including lift thicknesses, moisture content, and degree of compaction;

6.4.3.h. Material and gradation requirements for sub-surface drainage structures;

6.4.3.i. Pipes;

6.4.3.j. Concrete, including testing and curing;

6.4.3.k. Anti-seep mechanisms;

6.4.3.l. Cutoff trenches;

6.4.3.m. Channel and slope protection (e.g., riprap);

6.4.3.m. Project quality control and testing;

6.4.3.o. Blasting;

6.4.3.p. Construction erosion and sediment control;

6.4.3.q. Construction waste disposal;

6.4.3.r. Dust abatement;

6.4.3.s. Revegetation;

6.4.3.t. Installation and reading of monitoring devices;

6.4.3.u. Inspection and maintenance; and

6.4.3.v. Other information as requested by the director.

6.4.4. Maps and Drawings.

6.4.4.a. Maps shall be included in the plan package showing the project area in relation to primary highways, county seats, and major drainages. County highway maps may be used for this purpose.

6.4.4.b. A map showing the limits of the watershed with respect to the project area shall be included in the plan package. The minimum map scale meeting this requirement is a 7-1/2 minute United States Geological Survey topographic map with the project area plotted on it.

~~6.4.4.c. A plan view of the project area that shows all disturbed and reservoir areas shall be included in the plan package showing detailed contour intervals (i.e., a five-foot maximum interval). The location of springs, seeps, underground mines, mine drainage, mine openings, the subdrain system, project stationing, cross-sections, borings and test pits, instrumentation, reference points, channels, waste disposal areas, and other pertinent data shall be included in the plan view. Additional detailed plan views of the dam or its spillways and appurtenances may be required by the director.~~

6.4.4.c. A plan view map of the project area that shows all disturbed and reservoir areas shall be included in the plan package showing detailed contour intervals (i.e., a five-foot maximum interval).

6.4.4.c.A. The location of the following items, if present, shall be plotted on the plan view map:

6.4.4.c.A.(a) Caves;

6.4.4.c.A.(b) Cemeteries and graves;

6.4.4.c.A.(c) Seeps;

6.4.4.c.A.(d) Springs;

6.4.4.c.A.(e) Mine drainage;

6.4.4.c.A.(f) Underground mine openings;

6.4.4.c.A.(g) Underground mine workings;

6.4.4.c.A.(h) Borings and test pits;

6.4.4.c.A.(i) Cross-sections;

6.4.4.c.A.(j) Project stationing;

6.4.4.c.A.(k) Reference points;

6.4.4.c.A.(l) Instrumentation;

6.4.4.c.A.(m) The subdrain system;

6.4.4.c.A.(n) Diversion channels;

6.4.4.c.A.(o) Surface water drainage channels;

6.4.4.c.A.(p) Spillway channels;

6.4.4.c.A.(q) Borrow source areas; and

6.4.4.c.A.(r) Proposed waste disposal areas.

6.4.4.c.B. Additional detailed plan views of the dam or its spillways and appurtenances may be required by the director.

6.4.4.d. Transverse and longitudinal cross-sections and profiles of the dam shall be included in the plan package showing original ground, subdrain locations, elevations, benches, spillways, and other pertinent features of the project area. A cross-section shall be provided for stability computations showing the dam at critical areas, with subsurface data plotted in accordance with the provisions of Section 7.4.2.a.C.(d) of these regulations.

6.4.4.e. Cross-sections and profiles of major drainage facilities shall be included in the plan package. ~~Additional cross-sections shall be taken in all critical areas such as curves and weak areas.~~ Additional cross-sections of critical areas, such as curves and weak areas, may be required by the director.

6.4.4.f. Construction drawings shall be included in the plan package showing subdrains, spillways, anti-seep mechanisms, and other pertinent structures.

~~6.4.5. Environmental Inventory. An environmental inventory must be conducted by each applicant for a certificate of approval to provide information which will enable the director to determine potential damage to biological and cultural resources within the~~

~~project--area--resulting--from--the-issuance-of-the-certificate-of approval.--The-director-may-withhold-the-issuance-of-a-certificate of-approval-until-appropriate--biological--and--cultural--resource agencies-approve-the-proposed-project.~~

~~6.4.5.a.--Biological-resources-to-be-inventoried-include:~~

~~6.4.5.a.A.--Rare-and-endangered-species;~~

~~6.4.5.a.B.--Wildlife-habitat,-including-the-habitat-of rare-and-endangered-species;~~

~~6.4.5.a.C.--Wetlands;~~

~~6.4.5.a.D.--Caves-as--habitat,--nesting,--or--breeding places;-and~~

~~6.4.5.a.E.--Snake-dens.~~

~~6.4.5.b.--Cultural-resources-to-be-inventoried-include:~~

~~6.4.5.b.A.--Historical-and-archaeological-sites;~~

~~6.4.5.b.B.--Areas-of-unique-scientific,-ecological,-or geological-importance;-and~~

~~6.4.5.b.C.--Cemeteries.~~

~~6.4.5.c.--The-minimum-acceptable-environmental--inventory shall--include-formal-inquiries-to-the-West-Virginia-Department-of Natural-Resources's-biological-data-base--and--the--West--Virginia Department--of--Culture--and--History's-cultural-data-base-and-the mapping-of-obvious-and-known-biological-and-cultural--features--on the--location-and-plan-view-maps-required-under-Section-6.4.4.c-of these-regulations.--If-biological-or-cultural--resources--are--not present,--that-fact-must-be-stated-in-the-inventory-section-of-the application-as-well-as-a-description-of-the-procedures-followed-to arrive-at-such-a-conclusion.~~

6.4.5. Inventory of Protected Sites.

6.4.5.a. An inventory of sites protected under State or federal law must be conducted by each applicant seeking a certificate of approval to:

6.4.5.a.A. Construct a new dam; or

6.4.5.a.B. Alter or enlarge an existing dam whereby new areas will be disturbed or flooded.

6.4.5.b. The minimum acceptable protected sites inventory shall include the following components:

6.4.5.b.A. A field survey shall be conducted by the applicant or his agents to ascertain the presence of any cave (i.e., a naturally occurring underground subterranean cavity such as a cavern or grotto) within the area to be disturbed or flooded by the project. The location of all caves must then be plotted on the plan view map required under Section 6.4.4.c of these regulations. If no caves are present in the area to be disturbed or flooded, that fact must be noted in a statement attached to the plan view map submitted to the director.

6.4.5.b.B. A field survey shall be conducted by the applicant or his agents to ascertain the presence of any cemetery or grave within the area to be disturbed or flooded by the project. The location of all cemeteries and graves must then be plotted on the plan view map required under Section 6.4.4.c of these regulations. If no cemeteries or graves are present in the area to be disturbed or flooded, that fact must be noted in a statement attached to the plan view map submitted to the director.

6.4.5.b.C. A copy of the plan view map required under Section 6.4.4.c of these regulations shall be sent by the applicant to the West Virginia Department of Natural Resources, Nongame Wildlife Program, P.O. Box 67, Elkins, West Virginia 26241. A letter of transmittal that briefly explains the nature of the applicant's project must accompany the map so that State officials may have the opportunity to assess whether the applicant's project will adversely impact any animal or plant species that is listed by the federal government as endangered or threatened in 50 C.F.R. Part 17. A copy of the applicant's letter of transmittal must be included in the plan package submitted to the director; and

6.4.5.b.D. A copy of the plan view map required under Section 6.4.4.c of these regulations shall be sent by the applicant to the West Virginia Department of Culture and History, Historic Preservation Unit, Building 9, State Capitol Complex, Charleston, West Virginia 25305. A letter of transmittal that briefly explains the nature of the applicant's project must accompany the map so that State officials may have the opportunity to assess whether the applicant's project will adversely impact any historic site that is listed by the West Virginia Department of Culture and History on the State Register of Historic Places. A copy of the applicant's letter of transmittal must be included in the plan package submitted to the director.

6.4.5.c. If either artifacts of historical significance or human remains are uncovered by construction or related activities, the staff of the Department's Dam Control Office must be contacted immediately. The director may suspend activities in the vicinity of such artifacts or remains until appropriate investigations have been conducted.

§47-34-7. Design Requirements.

7.1. Hydrologic Considerations.

7.1.1. General Hydrologic Requirements.

7.1.1.a. Hydrologic Investigation.

7.1.1.a.A. A survey shall be conducted to evaluate soil types, land use, land slope, watershed area, runoff curve number, and any other factors needed to establish watershed characteristics. A summary of all hydrologic and hydraulic data compiled in the initial site investigation and used in the analysis shall be included in table or figure form in the plan package.

7.1.1.a.B. A stream flow analysis shall be conducted to evaluate stream flow quantity and quality as it affects the dam and its appurtenances.

7.1.1.b. Design Storm Requirements. All dams shall be designed to meet the following minimum hydrologic criteria based upon hazard classification:

7.1.1.b.A. Class A Dams. Class A dams shall be designed for a minimum of P100+0.12(PMP-P100) inches of rainfall in six (6) hours.

7.1.1.b.B. Class B Dams. Class B dams shall be designed for a minimum of P100+0.40(PMP-P100) inches of rainfall in six (6) hours.

7.1.1.b.C. Class C Dams. Class C dams shall be designed for the probable maximum precipitation of six (6) hours in duration.

7.1.1.c. Antecedent Moisture Conditions. Where applicable to the development of a hydrograph, Antecedent Moisture Condition II (AMC II) may be used unless a different condition class is required by the director.

7.1.1.d. Flood Routings. An analysis shall be performed for the reservoir and spillways which includes inflow hydrographs, stage storage curves, stage discharge curves, and routings. The spillways must be able to safely discharge that portion of the design storm that is not stored in the reservoir. If a computer analysis is used, the input data and output results must be clearly labeled and identified. Trial calculations or intermediate results not relevant to the final results may be omitted from the plan package.

7.1.2. Specific Hydrologic Requirements.

7.1.2.a. Embankment Dams.

7.1.2.a.A. Storage and Discharge.

7.1.2.a.A.(a) Class A dams must be designed with either an open channel spillway only or a combination of principal and emergency spillways. A Class A dam shall be capable of passing that portion of the design storm that cannot be safely stored in the impoundment. The design of a Class A dam must assure that ninety percent (90%) of the stored volume of the design storm will be discharged within ten (10) days after the storm event.

7.1.2.a.A.(b) Class B dams must be designed with either an open channel spillway only or a combination of principal and emergency spillways. A Class B dam shall be capable of passing that portion of the design storm that cannot be safely stored in the impoundment. The design of a Class B dam must assure that ninety percent (90%) of the stored volume of the design storm will be discharged within ten (10) days after the storm event.

7.1.2.a.A.(c) Class C dams designed with either an open channel spillway only or with an emergency spillway and a principal spillway together must be capable of discharging that portion of the probable maximum precipitation that cannot be safely stored in the impoundment. Class C dams designed with a decant or principal spillway only must be capable of storing ~~one~~ the volume of water generated by a PMP rainfall event of six (6) hours in duration. The design of a Class C dam must assure that ninety percent (90%) of the stored volume of the design storm will be discharged within ten (10) days after the storm event.

7.1.2.a.B. Surface Drainage Control. Surface drainage control devices (e.g., vegetated slopes, benches, groin ditches, and collection channels) shall be provided as necessary to protect the dam and its appurtenances from the effects of erosion. Riprap or other erosion protection measures shall be included where excessive velocity is anticipated or experienced. All surface drainage control devices must be designed to exit safely beyond the downstream toe of an embankment in a natural drainway capable of carrying the design flow without excessive erosion. The 50-year, 6-hour rainfall event shall be used as the design storm for surface drainage systems.

~~7.1.2.a.C. Spillway Frequency of Operation. Vegetated earth and unlined earth emergency spillways shall not operate more frequently than the following recurrence schedule:~~

7.1.2.a.C. Spillway Frequency of Operation. Outlet works that incorporate vegetated earth or unlined earth emergency spillways shall be designed so that the average frequency of

operation is no greater than the following recurrence schedule, based upon a 6-hour rainfall event:

7.1.2.a.C.(a) Class A Dams. Once in twenty-five (25) years.

7.1.2.a.C.(b) Class B Dams. Once in fifty (50) years.

7.1.2.a.C.(c) Class C Dams. Once in one hundred (100) years.

~~7.1.2.a.D.--Overtopping-Embankments.--Dams-designed-to overtop--in-accordance-with-the-provisions-of-Section-7.4.2.a.D-of these-regulations-shall-not-overtop-more-frequently-than--once--in one-hundred-(100)-years,-regardless-of-hazard-classification.~~

7.1.2.a.D. Overtopping Embankments. Regardless of their hazard classification, dams designed to overtop in accordance with the provisions of Section 7.4.2.a.D of these regulations shall not overtop more frequently than once in one hundred (100) years, based upon a 6-hour rainfall event.

7.1.2.b. Gravity Dams. Gravity dams may be designed in the same manner as the corresponding hazard classes of embankment type dams in Section 7.1.2.a.A of these regulations except that designed overtopping of the dam may be substituted for the emergency spillway requirements.

7.1.2.c. Waste Disposal Dams.

7.1.2.c.A. Storage and Discharge. The following storage and discharge systems may be used in design of waste disposal dams:

7.1.2.c.A.(a) Open Channel Only or Emergency Spillway with Principal Spillway. A dam designed with either an open channel spillway only or with an emergency spillway and a principal spillway together shall be capable of discharging that portion of the design storm that cannot be safely stored in the impoundment. This type of design must assure that ninety percent (90%) of the stored volume of the design storm will be discharged within ten (10) days after the storm event. Slurry impoundments shall be provided with a means of removing water to maintain the lowest practical water level.

7.1.2.c.A.(b) Principal Spillway or Decant Only. A dam designed with a decant or principal spillway only shall be capable of storing the volume equivalent to a minimum of one (1) design storm. This type of design must assure that ninety percent (90%) of the stored volume of the design storm will be discharged within ten (10) days after the storm event. Slurry impoundments shall be provided with a means of removing water to maintain the lowest practical water level.

7.1.2.c.A.(c) No Outlet Works. A dam designed without discharge structures shall be capable of storing the volume equal to a minimum of two (2) design storms. Water shall be removed from the impoundment to its lowest practical level by pumping or other means if storm water reduces the storage capacity to one (1) design storm or less.

7.2. Hydraulic Considerations.

7.2.1. General Hydraulic Requirements.

7.2.1.a. Hydraulic Analysis. Using standard engineering practices, a hydraulic analysis shall be performed for the spillways and surface drainage system. Typical cross-section design techniques may be used where constant slopes are encountered. All hydraulic structures shall be designed to safely control the velocity of water in order to prevent excessive erosion. Accepted engineering practices shall be used to design riprap, non-flexible channel linings, bedding, and energy dissipators.

7.2.2. Specific Hydraulic Requirements.

7.2.2.a. Open Channels. Open channels, including open channel spillways, shall be analyzed for flow depth, velocity, nonuniform flow conditions, superelevation, and hydraulic jumps.

7.2.2.a.A. Stage Discharge. Where an open channel is used as a spillway, a stage discharge rating shall be developed using standard engineering practices for the type and shape of the spillway. In developing the rating, increase in upstream water depth due to change in velocity head must be considered.

7.2.2.a.B. Water Surface Profiles. Where channel slopes or cross-sections vary and nonuniform flow conditions result, a water surface profile may be necessary in order to analyze the channel flow depths and the location of hydraulic jumps.

7.2.2.a.C. Hydraulic Jumps. Where hydraulic jumps will occur, channel sidewall height shall be sufficient to contain the jump. The channel lining shall be designed to withstand the hydraulic jump without damage.

7.2.2.a.D. Critical Flows. Channels shall be designed so that water will not flow at critical depth for extended distances. In channels of varying slope or cross-section where nonuniform flow occurs, the transition through critical flow shall be as rapid as possible.

7.2.2.a.E. Superelevation. Channel walls shall be designed to contain superelevated flows in curves. Where curves occur in spillway channels, the director may approve superelevation wall height based upon one-half of the design flow,

but not less than the P100 design flow, provided the excess overflow will impinge on natural ground and will not endanger the dam, human life, or property.

7.2.2.b. Closed Conduit Systems. Closed conduit systems including principal spillways, risers, and pipes shall be analyzed to determine the controlling limits of weir, orifice, and pipe flows.

7.2.2.b.A. Risers and Drop Inlets. Risers shall be protected with a designed trash rack and anti-vortex device. The drop inlet should be sized to provide a rapid transition from partial to full pipe flow conditions.

7.2.2.b.B. Stage Discharge. When a closed conduit system is used as a principal system, a stage discharge rating shall be developed using standard engineering practices for weir, orifice, and pipe flow calculations.

7.2.2.b.C. Slug Flow. Conduit systems shall be designed to avoid formation of alternating partial and full pipe flow conditions through proper selection of pipe slope and headwater or tailwater conditions.

7.3. Geotechnical Considerations.

7.3.1. Geotechnical Investigation. A geotechnical investigation shall be performed. The quantity, location, and depth of borings, test pits, or trenches must be adequate for the evaluation of the bearing capacity and subsurface conditions for the proposed structure and may vary based upon the height, impoundment volume, and hazard classification of the dam. Factors to be considered include depth of soil, characteristics of bedrock, and determination of groundwater location. Results of in-situ testing and soil sampling shall be reported in the plan package. Soil profiles shall be utilized for critical foundation locations of the structure, spillways, and other pertinent locations which affect the safety of the structure. A geological study shall also be conducted to evaluate stratigraphy, landslides, bedrock discontinuities such as soft seams, joints, joint systems, bedding planes, and fault zones which may adversely affect the structure's performance. Past and future mining including thickness of coal seams, depth and type of rock above the coal seam, and previous or expected subsidence problems shall be considered where subsidence may affect the safety of the structure.

7.3.1.a. Project Area Survey. A project area survey shall be conducted to establish baselines and elevations of the dam embankments, reservoir and borrow areas, and appurtenant structures. The survey shall locate all test pits, borings, gas wells, oil wells, water wells, mine openings, landslides, and areas of natural seepage.

7.3.1.b. Borrow Areas. Borrow areas shall be evaluated for appropriate construction materials and required volume. Borrow areas and excavation materials shall be tested to determine the suitability of material for use in embankments or drains.

7.3.2. Laboratory Testing. Laboratory tests shall be conducted on a sufficient number of samples of foundation and embankment materials to provide an accurate representation of soil conditions. Tests shall include, but not be limited to, a complete soil classification including grain size, sieve, hydrometer analysis, Atterberg limits, density, water content, compaction tests, shear strength, consolidation, and permeability where applicable. Compaction and proctor curves shall be developed for all fill materials as appropriate.

7.3.3. Geotechnical Evaluation. A summary of all geotechnical data determined in the initial site geotechnical investigation and used in the analysis shall be included in table or figure form in the plan package.

7.3.3.a. Seepage Analysis. An analysis of seepage and its detrimental effects on structural integrity shall be made. The analysis shall include consideration of potential piping in the embankment, foundations, and abutments. Seepage control measures shall be specified as necessary in order to enhance the stability of the embankment and adjacent area. Drainage systems shall be designed and constructed using a material approved by the director and shall be protected by a properly designed filter zone using standard geotechnical engineering design practices. The design shall specify methods for sealing or controlling seepage encountered in foundation zones during construction.

7.3.3.a.A. Foundation Treatment. If analysis indicates a highly fractured foundation, the engineer shall specify necessary treatment of the foundation zone including, but not limited to, foundation grout curtains, dental concrete treatment of fractures or overhangs, and detailed methods of foundation zone cleaning. Material used in grouts shall be specified in accordance with the provisions of Section 7.4.1.a.B of these regulations.

7.3.3.b. Foundation Stability. The foundation must be designed to have adequate bearing capacity to support the embankment and any appurtenant works. Potential subsidence and settlement and their consequences shall be considered using standard engineering practices. Special attention shall be given to differential settlement which would lead to cracking of the dam. Spillway pipes on compressible foundations shall be protected from damage due to settlement.

7.3.3.c. Landslides. The potential for landslides, as determined in the initial project area investigation, shall be evaluated by the engineer. If landslides noted in the project

area could cause instability of the dam or appurtenant structures, blockage of spillways and other critical drainage structures, or overtopping of the dam by displacement of water in the reservoir area, such conditions shall be corrected to a minimum static safety factor of 1.5.

7.4. Structural Considerations.

7.4.1. General Structural Requirements. All structures shall be designed to perform as intended for the design life of the dam with proper maintenance or replacement.

7.4.1.a. Structural Materials. Materials selected for use in the dam shall be of adequate quality and durability for the intended purpose of the structure. All structures shall be designed to have sufficient strength plus an adequate safety factor against failure during maximum anticipated loading conditions.

7.4.1.a.A. Earth Materials. Earth materials selected for use in dam construction shall be free from roots, brush, organic materials, construction waste, and other debris. Where rock or rock fill is specified, the rock shall be durable and not subject to slaking or breakdown. Size gradations of the earth materials shall be specified to perform as planned. Compaction requirements for earth materials shall be specified in the plan package.

7.4.1.a.B. Concrete Design. Concrete shall be designed in accordance with standard engineering practices. Concrete design specifications shall include materials, proportioning, form-work, reinforcement, joints and embedded items, production, placing, repair of surface defects, finishing, curing and protection, testing, evaluation and acceptance, and allowable tolerances for acceptance.

7.4.1.a.B.(a) Concrete Specifications. The engineer shall specify the nature of concrete to be used with sufficient detail for on-site quality control. The concrete may be specified by specific mix, aggregate, water content, additives, compressive strength, slump, and air entrainment or by reference to specific standards of concrete quality. If published standard specifications are referenced, a copy of the standard or pertinent sections of the standard shall be included in the plan package.

7.4.1.a.B.(b) Concrete Placement. The engineer shall specify methods and limits of placement of the concrete including foundation preparation, maximum lift height, maximum time allowed between mixing and placement, methods of working into forms and corners, methods of consolidation and use of vibrating devices, and allowable ambient air temperatures and concrete temperatures.

7.4.1.a.B.(c) Concrete Curing. The engineer shall specify the method of curing the concrete including moist curing or membrane curing, wetting, types of covering, acceptable curing temperature range of the concrete, any anticipated cold weather curing specifications or methods such as protection from freezing and insulation methods, hot weather placement methods and limitations, and curing time.

7.4.1.a.B.(d) Concrete Finishing. The engineer shall specify the type of finishing to be applied to the concrete and the acceptable temperature range.

7.4.2. Specific Structural Requirements.

7.4.2.a. Embankment Dams.

7.4.2.a.A. Selection of Materials. Material selected for construction of embankments shall be select earth material that is free from roots, brush, organic matter, construction waste, and other debris. The material must not be subject to breakdown or chemical reaction. ~~The--material~~ Unless otherwise approved by the director, the selected material must be thoroughly tested for density, shear strength, liquid and plastic limits, and optimum moisture content. The source of the material and available quantities shall be identified and adequate sampling performed in order to attain consistent quality and soil characteristics.

7.4.2.a.B. Zoned Embankments.

7.4.2.a.B.(a) Filter Drains. Filter drains shall be used in embankment zones where necessary to intercept seepage, reduce phreatic level, and reduce potential for internal erosion. Drain outlets shall be visible, not submerged under normal conditions, unobstructed, and protected with an animal guard where conduits are utilized.

7.4.2.a.B.(a)(A) Gradations. The gradations of the filter material shall be sized to prevent or resist the migration of embankment material into the voids of the filter. The filter shall be permeable relative to the surrounding embankment material.

7.4.2.a.B.(a)(B) Size. The filter drain shall be capable of passing the maximum anticipated seepage flows without excessive pore pressure. The combination of filter permeability and area shall be considered in sizing the drain.

7.4.2.a.B.(a)(C) Durability. The material used in the filter shall be hard, durable material that is not subject to slaking, breakdown, or chemical reaction.

7.4.2.a.B.(a)(D) Conduits. Perforated pipes may be used in the filter drain to increase capacity. Perforations shall be compatible with the filter gradations so that filter material will not enter the pipe. The pipe shall be capable of supporting the fill load and shall be of a material which will last for the design life of the structure. Corrugated metal pipe shall not be used in critical areas of the embankment or in any areas where the pipe is not reasonably accessible for replacement.

7.4.2.a.B.(a)(E) Filter Cloth. Filter cloth shall not be used in critical areas of the embankment or in any areas where the cloth is not reasonably accessible for replacement.

7.4.2.a.B.(b) Diaphragm Cutoff Walls. When concrete cutoff walls are used as an impermeable barrier, the concrete wall shall be placed upon an adequate foundation and be constructed of reinforced concrete. Where pipes pass through the concrete wall, adequate support for the pipe shall be provided to prevent differential settlement and pipe shearing.

7.4.2.a.C. Embankment Stability.

7.4.2.a.C.(a) Embankment Safety Factors. Slope stability shall be analyzed to show that the embankment design achieves the following factors of safety under the conditions listed:

7.4.2.a.C.(a)(A) A safety factor of 1.5 for the embankment loading conditions specified in Section 7.4.2.a.C.(c) of these regulations;

7.4.2.a.C.(a)(B) An end of construction safety factor of 1.3;

7.4.2.a.C.(a)(C) A rapid drawdown safety factor of 1.2; and

~~7.4.2.a.C.(a)(B) A seismic safety factor of 1.2.~~

7.4.2.a.C.(a)(D) An earthquake safety factor under steady-state seepage conditions of 1.2 using seismic loading appropriate to the geological site conditions.

7.4.2.a.C.(b) Appurtenance Structural Stability. Embankments constructed as part of an appurtenant structure where failure will lead to a dangerous condition in the dam shall achieve a static safety factor of 1.5.

7.4.2.a.C.(c) Embankment Loading Conditions. Loading conditions shall assume a long-term steady-state condition with the phreatic surface originating at the elevation of the

emergency spillway crest for embankment dams with emergency spillways or at a maximum design pool elevation for embankment dams without spillways.

7.4.2.a.C.(d) Stability Analyses. All slope stability analyses shall be performed using standard engineering practices. Exceptions to this requirement will be allowed by the director only where there is sufficient evidence to indicate that slope failures will not occur.

7.4.2.a.C.(d)(A) Critical cross-sections of the dam using equal X and Y axes scales shall be provided in the plan package. The cross-sections shall show the embankment limits, foundation zones, soil zones, phreatic line, assumed reservoir elevation, stability arcs or failure planes through the dam, and resulting safety factors for each critical arc or failure plane shown.

7.4.2.a.C.(d)(B) A listing of soil zone unit weights, angles of internal friction, and cohesion values for each soil shown on the cross-section shall be provided in the plan package. If an alternative analysis is utilized, assumed soil values of the analysis shall be shown.

7.4.2.a.D. Overtopping Embankments.

7.4.2.a.D.(a) Rock-Covered Embankments. Rock-covered embankments shall be designed so that the rocks selected will be sized to withstand the maximum depth and velocity of the overtopping flow and be individually placed to maximize the interlocking effect. A minimum of two (2) layers of boulders is required. Boulders shall cover the crest, downstream face, and necessary areas of the upstream face of the dam and extend beyond the dam abutments to the extent necessary to contain the overtopping flow depth. Graded smaller rock shall fill the voids where the boulders contact the embankment to prevent erosion due to flow through the voids. The rock cover may be covered with soil and vegetated, provided that the equipment used to place the soil will not break the rock.

7.4.2.a.D.(b) Roller-Compacted Concrete Embankments. Roller-compacted concrete lift thickness and width shall be sized to withstand the maximum anticipated loading and uplift forces. Filter drains and weep holes shall be provided to relieve hydrostatic pressure behind roller-compacted concrete facings. The roller-compacted concrete may be covered with soil and vegetated.

7.4.2.b. Gravity Dams.

7.4.2.b.A. Stability Loading Conditions. Loading conditions for the stability analysis shall assume maximum overflow head from the design storm.

7.4.2.b.B. Gravity Dam Stability.

7.4.2.b.B.(a) Overturning. The reaction of all forces must act within the middle one-third of the base. This requirement may be modified by the director if detailed computations prove that overturning will not occur.

7.4.2.b.B.(b) Sliding. The dam shall have a factor of safety against sliding of at least 3.0 for normal loading conditions and 1.5 for maximum loading conditions.

7.4.2.b.B.(c) Bearing. The factor of safety against bearing failure shall be at least 1.5 for maximum stress at the downstream toe.

7.4.2.c. Waste Disposal Dams. The potential for liquefaction must be considered and the design shall include safeguards against the development of this condition.

7.4.2.d. Spillways. All spillways shall be designed to discharge an adequate distance beyond the downstream toe of the dam in a natural drainway to prevent erosion of the downstream toe or other detrimental effects to the dam structure.

7.4.2.d.A. Conduit Spillways. Inlets shall be protected by a designed trash rack and riser type spillways shall be designed to prevent detrimental vortexing. Risers shall have adequate weight to be non-buoyant and shall be of sufficient strength to withstand maximum dynamic water and ice forces. Foundations for risers shall be designed to support the riser without serious movement or deformation.

7.4.2.d.A.(a) Conduits. Pipe conduits shall be placed on a designed foundation and bedding of sufficient strength to minimize settlement and other detrimental effects to the conduit. Anti-seep or anti-piping mechanisms shall be provided for all conduits passing through the dam, foundation, or abutments to control seepage along the pipe. Design allowances shall be made to compensate for differential settlement, elongation, and movement of the pipe conduit if the cradle is placed on a yielding foundation. Pipe conduits shall be of sufficient strength to support the maximum external loads and the maximum internal hydraulic pressure without leaking, and shall resist uplift pressures. The pipe conduit shall be constructed of material which will not deteriorate during the design life of the structure. ~~Corrugated metal pipes, whether coated or uncoated, shall not be used in Class B or Class C dams.~~

7.4.2.d.A.(a)(A) Use of Corrugated Metal Pipes. Corrugated metal pipes, whether coated or uncoated, shall not be used in new Class B or new Class C dams. Corrugated metal pipes in existing dams must be either replaced with new pipe or retrofitted with an appropriate liner if the director determines

that the existing pipe constitutes a hazard to the proper operation of the dam because the pipe has developed leaks, has deteriorated, or has otherwise ceased to function properly.

7.4.2.d.A.(b) Outlets. Pipe conduits shall be designed to outlet in a natural drainway or a designed channel leading to a natural drainway. An energy dissipator shall be provided to eliminate erosion at the pipe outlet and be designed for maximum pipe flow. If pipe blockage by animals may occur, the pipe outlet shall be protected by an animal guard.

7.4.2.d.A.(c) Gated Drain Pipe Required. All new freshwater dams shall have a gated drainpipe for draining the impoundment. The gate shall be located in the reservoir or upstream of the cutoff wall or impermeable zone. If the gate is located within the embankment or structure, a service well shall be provided. The elevation of the gate system shall be such that the reservoir will be drained completely to original stream level. The drain system shall be designed to drain ninety percent (90%) of the volume of stored water at normal pool in ten (10) days including normal base flow and have a minimum capacity of three (3) times the normal base flow for the watershed with a headwater-to-diameter (HW/D) ratio of 1.5, unless otherwise approved by the director. The drain conduit shall meet the requirements for conduits set forth in Section 7.4.2.d.A.(a) of these regulations. A designed trash rack shall be provided at the inlet of the drain. The controls to operate the drain gate shall be accessible without the use of specialized equipment or of divers. The drawdown rate for reservoir storage volumes in excess of two thousand (2000) acre-feet may be established by the director.

7.4.2.d.B. Open Spillways. Unless specifically excluded, spillways of this type include the various designs of open type spillways including open channel, side channel, chute, labyrinth, and ogee.

7.4.2.d.B.(a) Earth Spillways. Spillways that are constructed of or in earth material shall be designed to pass the maximum design flow without excessive erosion. Earth spillways shall not be constructed over dam embankment fill material.

7.4.2.d.B.(a)(A) Flexible Linings. Vegetation, rock riprap, soil reinforcement, or other flexible linings may be used to increase flow quantities and velocities in earth spillways within design limits.

7.4.2.d.B.(b) Concrete Spillways.

7.4.2.d.B.(b)(A) Concrete. The engineer shall specify the grade and strength of concrete to be used in the spillway construction. The concrete structure shall be of sufficient strength to withstand the maximum design applied load.

7.4.2.d.B.(b)(B) Foundation. Concrete shall be placed on a prepared foundation and bedding capable of sustaining the applied loads without excessive deformation.

7.4.2.d.B.(b)(C) Drains. Designed filter drains and water pressure relief devices shall be provided under concrete slabs and walls to collect and safely convey water from seepage or leakage of construction joints and to relieve uplift pressure from seepage conditions.

7.4.2.d.B.(b)(D) Joints. Construction joints shall be made watertight by use of a sealant material. Sliding joints shall be supported by slabs to maintain alignment.

7.4.2.d.B.(b)(E) Cutoff Barriers. Cutoff barriers keyed into the foundation shall be provided to prevent or reduce seepage flows under the spillway.

7.4.2.d.B.(b)(F) Energy Dissipators. An energy dissipator shall be provided to reduce the hydraulic energy at the end of the spillway. The dissipator shall be designed to function properly for flows of at least one-half of the design spillway flow. Flows in excess of the design capacity of the energy dissipator shall not endanger the dam or its appurtenances and may result only in erosion.

7.4.2.d.B.(c) Nonstandard Spillway Design. The director may reject any spillway design if such design is of a nonstandard or untested nature and it is not possible to analytically predict the performance of the spillway or the detrimental effects of cross-waves, eddies, ~~vortexes~~ vortices, superelevation, or hydraulic jumps within the spillway system.

7.4.2.e. Water Supply Pipes. Water supply pipes through a dam shall be constructed of a long-life, high-strength material. Welded joints or mechanical joints with sealing rings, or an alternative sealing method approved by the director, shall be utilized. Pipes shall be properly bedded to reduce differential settling or elongation. Anti-seep mechanisms or filter drains shall be provided to prevent piping along the exterior of the pipe. If the pipe is enclosed in or passes through concrete, the relative coefficients of expansion shall be considered. Anti-corrosive measures shall be employed if soil tests indicate corrosion may be a problem. An upstream shutoff valve shall be installed on all new dams or when upgrading existing dams where reservoirs are to be drained as part of the upgrading. The section of the pipe through the dam shall be capable of withstanding a minimum pressure of twice the maximum reservoir head. The pipe shall be pressure-tested for leaks at maximum reservoir head pressure prior to the final covering of the pipe installation.

7.5. Miscellaneous Considerations.

7.5.1. Erosion and Sediment Control. Erosion and sediment control measures sufficient to comply with the provisions of Section 8.1.13 of these regulations shall be included in the project design.

7.5.2. Waste Disposal Areas. The engineer shall delineate locations in the project area which are to be used as waste disposal areas.

7.5.3. Instrumentation. The engineer shall recommend instrumentation as necessary to monitor and measure performance of new dams or modifications to existing dams. The engineer shall specify the types and purpose of the recommended instrumentation.

7.5.3.a. Piezometers or Observation Wells. Piezometers or observation wells may be required by the director on embankment type dams to monitor phreatic level and water pressures in critical areas of the embankment and, if necessary, the foundation or abutments. All piezometer or well heads shall be anchored in concrete and protected from vandalism with a locking metal cylinder surrounding the piezometer or well pipe.

7.5.3.b. Survey Monuments. Survey monuments may be required by the director on embankment and gravity dams to monitor displacement, settlement, rotation, and deformation. Survey monuments on earth dams shall be sufficiently embedded into the structure to prevent localized movement of the monument. Protective casings shall be installed if necessary to prevent damage or forced movement of the survey point.

7.5.4. Staged Construction. ~~Dams~~ Waste disposal dams designed in stages of construction shall be capable of storing or passing the design storm specified in Sections 7.1.1.b and 7.1.2.a.A of these regulations during all stages of construction except during the initial start-up period, unless otherwise approved by the director. During the initial start-up period, the dam shall be capable of storing or passing the P100 rainfall event as soon as possible. Construction shall increase storm capacity, reaching the full design storm capacity within two (2) years.

§47-34-8. Construction or Modification of a Dam.

8.1. Construction Requirements.

8.1.1. Notification of the Commencement of Construction. Prior to the commencement of construction activities in the project area, the person who has been issued a certificate of approval, or his representative, shall notify the director of the following:

8.1.1.a. The intent of the contractor to start construction in the project area and the date of such start-up.

8.1.1.b. The name, address, and telephone number of the owner's principal contact person at the project area who is responsible for communicating with the staff of the Department's Dam Control Office and for receiving inspections reports and legal notifications.

8.1.2. Conformance with Plans. All work undertaken in the construction or modification of a dam shall be in strict conformance with the plans and specifications contained in the plan package submitted under Section 5.1 of these regulations and approved by the director. Any changes to the approved plans and specifications shall be submitted to and approved by the director prior to implementation.

8.1.3. On-Site Documents. A copy of the certificate of approval, the approved plans and specifications, all outstanding notices or orders to comply that have been issued by the director, and the monitoring and emergency ~~warning~~ action plans prepared in accordance with the provisions of Sections 15.6 and 15.7 of these regulations shall be available at the project area office for reference by construction personnel and the director.

8.1.4. Adverse Weather Conditions. Construction work shall be suspended on all or part of the project when adverse weather conditions (e.g., prolonged precipitation, extreme temperatures) jeopardize the performance of work in conformance with the approved plan package.

8.1.5. Clearing and Grubbing. Clearing and grubbing shall be performed in the foundation, borrow, and soil stockpile areas. Clearing is required in the maximum permanent pool area unless otherwise approved by the director.

8.1.6. Foundation Preparation. Foundation preparation shall include installation of keyways and subdrains, removal of soft areas, and similar project area preparation operations dictated by the approved plans and specifications and by project area conditions. The foundation shall be inspected by the director prior to placement of embankment materials. If foundation problems are discovered during this inspection, additional foundation preparation may be required by the director.

8.1.7. Placement of Materials.

8.1.7.a. All fill shall be placed in accordance with the approved plans and specifications.

8.1.7.b. Compaction testing shall be completed as specified in the approved specifications; the results of such testing shall be reported in accordance with the provisions of Section 8.4.1 of these regulations.

8.1.7.c. Filter drains shall be constructed in accordance with the approved plans and specifications. Filter material shall be tested for compliance with design gradations; the results of such testing shall be reported in accordance with the provisions of Section 8.4.1 of these regulations. Filter materials shall be placed to prevent segregation and contamination and shall be concurrently covered to prevent contamination or damage.

8.1.8. Grading.

8.1.8.a. All fill shall be graded in accordance with the approved plans and specifications.

8.1.8.b. The working surface and outslopes of the fill shall be concurrently graded through all phases of embankment construction.

8.1.8.c. The top of the fill shall be crowned to provide positive drainage during construction.

8.1.8.d. Final grading shall be conducted in order to facilitate revegetation.

8.1.9. Spillways and Appurtenances.

8.1.9.a. Spillways and appurtenances shall be constructed in accordance with the approved plans and specifications.

8.1.9.b. When downslope placement of fill material is used in the construction of spillways, the fill material shall be compacted in horizontal layers to achieve the design configuration.

8.1.9.c. All riprap material shall be of hard, durable rock which is not acid-forming or toxic. Riprap shall be placed to prevent size segregation.

8.1.9.d. When bedding is used under riprap, the rock material shall be placed in a manner so as not to damage or contaminate the bedding.

8.1.9.e. When protective channel linings are specified, the linings shall be installed as soon as the channel is constructed to grade in accordance with the approved plans and specifications.

8.1.9.f. When concrete is used in construction of spillways and appurtenances, the concrete shall be placed, cured, and finished in accordance with the provisions of Sections 7.4.1.a.B.(b) through 7.4.1.a.B.(d) of these regulations. Standard engineering tests shall be performed in accordance with

the provisions of Section 8.2.2.a of these regulations and reported in accordance with the provisions of Section 8.4.1 of these regulations.

8.1.9.g. All pipes, risers, and appurtenances shall be installed in accordance with the approved plans and specifications. Compaction testing shall be completed to ascertain that fill material around pipes, risers, and appurtenances has been placed in accordance with the approved plans and specifications; the results of such testing shall be reported in accordance with the provisions of Section 8.4.1 of these regulations. Sufficient fill shall be placed over pipes so as to prevent damage by heavy equipment.

8.1.10. Minimum Stream Flow. An adequate flow of water may be required by the director in the stream below the dam during construction and reservoir filling to maintain water quality in the stream and to support fish and other aquatic life. The director may require stream flow augmentation in accordance with the provisions of Section 15.3.2 of these regulations.

8.1.11. Blasting. Blasting may only be utilized in accordance with and as specified in the approved plans and specifications. Blasting based upon unforeseen project area conditions not covered in the approved plan package shall not be performed prior to approval by the engineer with the concurrence of the director.

8.1.12. Storm Water Discharge. The sequence of construction work shall be planned to maximize the safe discharge of storm water while minimizing the amount of water retained in the impoundment. Either the principal spillway structures, including inlets and outlets, shall be operable prior to placement of construction material above the original valley elevation or diversion channels approved by the director shall be in place.

8.1.13. Erosion and Sediment Control.

8.1.13.a. General Requirements. Erosion and sedimentation must be controlled to prevent a degradation of land and streams below the dam or project area, including visible deposits of sediment, and to prevent any violation of State water quality standards. Erosion and sediment control measures shall, at the minimum, conform with current erosion and sediment control reference manuals and apply to the entire project area.

~~8.1.13.b. Specific Requirements.~~

~~8.1.13.b.A. Sediment Control Devices. Cleared areas, borrow areas, disturbed areas along stream channels and waterways, and fills (whether complete or in progress) must be equipped with diversions, waterways, sediment basins, straw bale dikes, or sediment fences. Straw bale dikes or sediment fences must be removed when no longer needed.~~

~~8.1.13.b.B.--Cleaning Frequency.--All sediment control devices--(e.g.,-diversions,-waterways,-sediment basins,-straw bale dikes,-or sediment fences)-must be inspected once--each--week--and after--each--rainfall,-and accumulated sediment must be removed in order to maintain design capacity.---All sediment ponds,-barriers, and traps must be restored to design capacity after each--rainfall or other sediment producing activity.~~

~~8.1.13.b.C.--Temporary Mulching.----Temporary mulching or--seeding--and mulching shall be utilized on bare areas where no construction activity is anticipated for a period of three-(3)--or more--weeks.---Areas--that--should--receive--seeding--or--mulching include,-but are not limited to,-the reservoir area,-borrow areas, soil stock piles,-and steep fill slopes where no further--work--is planned prior to final grading.~~

8.1.13.b. Specific Requirements. Cleared areas, borrow areas, disturbed areas along stream channels and waterways, and fills, whether complete or in progress, must be equipped with erosion and sediment control devices (i.e., diversions, waterways, sediment basins, straw bale dikes, or silt fences).

8.1.13.b.A. Location of Sediment Control Devices. Erosion and sediment control devices must be located as close to the disturbed area as practical. Effort must be made to contain the sediment load within the disturbed area in order to prevent the entry of sediments into the natural drainway or stream.

8.1.13.b.B. Removal of Sediment Control Devices. Erosion and sediment control devices must remain in place until permanent vegetation is established or the area is otherwise stabilized. Prior to the removal of the devices, trapped sediment must be removed and placed in a location approved by the director. Straw bale dikes and silt fences must be removed when no longer needed; sediment basins or ponds must be abandoned in a manner approved by the director. Barren and denuded areas remaining after the removal of a control device must be revegetated.

8.1.13.b.B.(a) The director may modify or waive the requirements of Section 8.1.13.b.B of these regulations for erosion and sediment control devices that are located within the impoundment area of the dam.

8.1.13.b.C. Cleaning Frequency. Sediment control diversions, silt fences, straw bale dikes, and waterways must be inspected once each week, and after each rainfall, and accumulated sediment must be removed in order to maintain design capacity. Sediment ponds, basins, and traps must be restored to design capacity when sediment accumulation approaches sixty percent (60%) of design capacity, or more frequently if so specified by the director in writing.

8.1.13.b.D. Temporary Seeding and Mulching. Temporary seeding and mulching shall be utilized on bare areas where no

construction activity is anticipated for a period of three (3) or more weeks. Areas that should receive seeding and mulching include, but are not limited to, the reservoir area, borrow areas, soil stock piles, and steep fill slopes where no further work is planned prior to final grading. Where seeding is not feasible due to severe slope or time of year, the director may approve mulching alone at a rate of three (3) tons of straw or hay per acre, or equivalent.

~~8.1.13.b.D.~~ 8.1.13.b.E. Water Routing. Water that is pumped or drained from work areas (e.g., excavations, foundations, and below grade fills) must be routed to properly-sized sediment control devices so that any sediment contained in the water is removed prior to discharge of the water from the project area. Pump discharges may not cause erosion or suspension of additional solids. No untreated water may be pumped or drained to the natural stream or stream diversion channel.

~~8.1.13.b.E. In-Stream Treatment. In-stream treatment shall not be used as the primary means of sediment control from the project area. In-stream treatment at undisturbed locations or downstream of the designed outlet channel shall not be used unless otherwise approved by the director.~~

8.1.13.b.F. In-Stream Treatment. Barriers, such as silt fences or straw bales, located in the natural drainway or stream will not be considered acceptable as the primary means of sediment control for the project area. Properly designed sediment basins or ponds may be used for sediment control in the natural drainway or stream if the location of the basin or pond does not cause significant additional disturbance in undisturbed downstream areas. Use of a starter dike or the dam under construction may be considered appropriate for sediment control of the reservoir area provided the necessary detention time is achieved.

~~8.1.13.b.F.~~ 8.1.13.b.G. Sediment Control During Construction. Erosion and sediment control measures must be in place prior to the beginning of dam construction activities. Clearing and grubbing or sediment control measures not specified for the beginning of construction must be implemented in a timely manner as needed.

~~8.1.13.b.G.~~ 8.1.13.b.H. Permanent Erosion Measures. Permanent measures (e.g., vegetation, grading, diversions, waterways, and outlet structures) shall be included on all completed or existing dams, where applicable, to prevent the erosion of embankments, abutments, stream channels, and waterways during the life and operation of the dam.

8.1.14. Disposal of Construction Wastes.

8.1.14.a. General Disposal Requirements. All waste materials that result from construction activities shall be disposed of in a manner approved by the director.

8.1.14.b. Specific Disposal Requirements.

8.1.14.b.A. Surplus Waste Materials. Surplus soil and rock materials shall be deposited in waste disposal areas delineated in the approved plans.

8.1.14.b.B. Organic Waste Materials. Trees, brush, root masses, and construction-related wood materials may be either buried in waste disposal areas delineated in the approved plan package or burned in accordance with local burning ordinances and State air pollution control regulations.

8.1.14.b.C. Concrete Waste Materials. New or old waste concrete materials may be disposed of in areas approved by the director for surplus soil and rock materials. New, unset waste concrete shall not be deposited in a location where it will enter watercourses, either directly or indirectly as a result of runoff. After it has set, the new waste concrete may be moved to waste disposal areas delineated in the approved plans.

8.1.14.b.D. Other Waste Materials. Chemicals, petroleum products, plastics, garbage, sewage, and any associated containers shall be disposed of in a manner approved by the director.

8.1.14.b.E. Off-Site Waste Materials. No waste materials or soil waste may be transported to the project area for disposal.

8.1.15. Dust Abatement. The contractor shall fully suppress dust on haul and access roads and as necessary within the project area. Water, or an alternative dust pallative approved by the director, shall be used for dust suppression; the use of oil or waste oil is prohibited.

8.1.16. Access Roads. A permanent access road shall be provided to each dam site. The road must be adequate for emergency vehicular traffic. Single lane unpaved roads are acceptable provided the roads are properly maintained. The access road must be designed and located as to not be unduly affected by stream or spillway flows during heavy rainfall events. The road may be secured with a locked gate provided that the key is available to dam monitors and State and local emergency personnel for emergency response.

8.2. Quality Control.

~~8.2.1. Construction Monitoring. All construction activities shall be monitored by an engineer or his designated representative. Responsibility to assess the quality of the workmanship and to ascertain compliance with the approved plans and specifications and the provisions of W. Va. Code §20-5B-9 shall be vested in the engineer. Critical phases of construction~~

~~shall--be-monitored-by-the-engineer-constantly;-noncritical-phases of-construction-shall-be-checked-at--least--once--per--day--during active--construction.---Additional--supervision-or-testing-will-be required-by-the-director-if-evidence--of--inadequate--construction supervision-exists.~~

8.2.1. Construction Monitoring.

8.2.1.a. All construction activities shall be monitored by an engineer or his designated representative. Construction monitoring shall not be the responsibility of the construction contractor unless specifically approved by the director in writing.

8.2.1.b. Responsibility for assessing the quality of the workmanship and ascertaining compliance with the approved plans and specifications shall be vested primarily in the owner's engineer. The staff of the Department's Dam Control Office shall also monitor construction activities and workmanship in order to ascertain compliance with the approved plans and specifications, in accordance with the provisions of W. Va. Code §20-5D-9.

8.2.1.c. Critical phases of construction shall be monitored by the engineer or his designated representative constantly during active construction; noncritical phases of construction shall be checked at least once per day during active construction.

8.2.1.d. Additional supervision or testing will be required by the director if evidence of inadequate construction supervision exists.

8.2.2. Materials Testing. Construction materials shall be periodically tested on-site to ascertain compliance with design specifications in the approved plan package. Final quality control testing shall not be the responsibility of the ~~-the-~~ construction contractor.

8.2.2.a. Concrete Testing. Routine tests of slump, air entrainment, and temperature shall be performed on each truck delivery. Cylinder samples for compression testing shall be taken each day or every twenty-five (25) cubic yards of delivered concrete, whichever is more frequent, unless otherwise required by the director.

8.2.2.b. Earth Fill Testing. Earth fill materials shall be tested for compaction and moisture content every alternate layer or each one thousand (1000) cubic yards, whichever is more frequent. Random fill shall be evaluated for compliance with approved gradation specifications. Critical fill areas shall have gradation tests performed to evaluate compliance with the approved specifications.

8.2.2.c. Filter Materials Testing. Gradation tests shall be performed on filter materials. Close visual observation for signs of material segregation shall be performed. Additional tests may be required by the director to determine durability and soundness of the filter material.

8.3. Construction Inspections.

8.3.1. Inspections During Construction.

8.3.1.a. A visual inspection for construction progress, unstable conditions, quality control, and conformance with the approved plans and specifications shall be held at least once each working day (or more frequently as determined by the engineer). The inspection shall be performed by an engineer or a person under the direct supervision of the engineer. The frequency of inspection may be changed by the director depending upon specific project area conditions.

8.3.1.b. Additional inspections shall be held after each heavy rainfall event in order to detect problems and propose remedial measures. These inspections shall be performed by an engineer or a person under the direct supervision of the engineer.

8.3.1.c. Instrumentation shall be monitored every seven (7) days unless otherwise specified by the engineer. Monitoring shall be performed by an engineer or a person under the direct supervision of the engineer. The frequency of monitoring may be changed by the director depending upon specific project area conditions.

8.3.2. Final Construction Inspection. Upon the completion of the construction or modification of a dam, a joint inspection shall be conducted by the director and the engineer. The purpose of the inspection is to verify that all work has been accomplished in accordance with the approved plan package.

8.3.3. Acceptance of Construction. When the dam owner is advised by the director that the construction appears satisfactory, the owner shall submit to the director a certification by an engineer that all construction was in substantial conformance with the approved plans and specifications, including any modifications that have been approved by the director. This certification shall be submitted within ninety (90) days of the director's advisement. As-built drawings, including all variations from the original specifications and changes in location of borrow or waste disposal areas, shall be submitted with the engineer's certification. If substantial modifications of the original specifications have been made during the construction period, the director may require that a corrected application form be submitted. Upon the receipt of the engineer's certification with the as-built drawings (and a corrected application form, if necessary), a letter of acceptance will be issued by the director.

8.3.4. Completed Dams. After acceptance of construction by the director, the dam and its appurtenances shall be inspected annually for a period of three (3) years by an engineer experienced in such inspections. The director reserves the right to attend any inspection and require prior notification of the inspection by the owner of the dam. A report of each inspection shall be prepared and filed with the director in accordance with the provisions of Section 15.5.1 of these regulations.

8.4. Construction Reporting Requirements.

8.4.1. Monthly Progress Reports During Construction. A written report containing the results of each inspection of construction progress shall be submitted to the director every month while the dam and its appurtenances are under construction. The report shall include, but not be limited to, specific instrumentation readings, test results, freeboard, crest elevation, and specific construction or quality control problems with documentation of implemented solutions. Upon the completion of the construction or modification of the dam, notice shall be given by the dam owner to the director so that a final construction inspection can be made in accordance with the provisions of Section 8.3.2 of these regulations.

8.4.2. Post-Construction Inspection Reports. A report shall be submitted to the director by the dam owner reporting the findings of the final construction inspection required under Section 8.3.2 of these regulations. Certification by an engineer shall be submitted to the director with the inspection report to verify that the dam and its appurtenances were constructed in substantial conformance with the approved plans and specifications and that the dam and its appurtenances are functioning as designed.

§47-34-9. Breaching of a Dam.

9.1. Application to Breach a Dam. The owner of a dam must obtain a certificate of approval from the director prior to the breaching of the dam. A complete application in accordance with the provisions of Section 5.1 of these regulations must be submitted to and approved by the director prior to the commencement of breaching activities.

9.1.1. Plan Package Requirements. The plan package submitted in order to breach a dam shall be in accordance with the applicable requirements of Section 6 of these regulations and must also include the specific requirements delineated in Sections 9.2 through 9.10 of these regulations. Narratives, plans, or specifications required under Section 6 of these regulations which are clearly not applicable to the proposed breaching activities may be omitted from the submittal; however, the director reserves the right to specify those items which must be included in the breaching plan package.

9.2. Breach Dimensions. The breach opening in the dam shall be designed so that any water resulting from design storm inflows that is temporarily impounded behind the residual structure shall be less than the height and storage requirements of a "dam" set forth in Section 2.6 of these regulations. The breach shall be to original stream bottom level, except that a small impoundment of less than one (1) acre-foot storage may be retained for sediment control purposes.

9.3. Breach Channel. The embankment shall be breached with a designed channel having the capacity to carry the peak runoff from the design storm corresponding to the dam's hazard classification. The channel created by the breach shall have an erosion-preventive lining adequate to withstand the depth and velocity of the peak flows from a P100 rainfall event. The channel side slopes shall achieve a minimum stability factor of safety of 1.5.

9.4. Safety. Reservoirs shall be completely drained before breaching operations begin. Breaching work should be scheduled during dry weather using National Weather Service advice and then proceed quickly to reduce the potential for impounding reservoir water.

9.5. Blasting. If blasting is to be used in the breaching of a dam, a blasting plan shall be submitted to the director for approval. The plan shall include the distance to existing structures and the measures that will be taken to minimize air blast and flying materials. A pre-blast survey of existing nearby structures and water wells which may be affected by blasting may be required by the director.

9.6. Erosion and Sediment Control. Erosion and sediment control measures sufficient to comply with the provisions of Section 8.1.13 of these regulations shall be implemented during the breaching operation. The following measures shall also be implemented:

9.6.1. Reservoir areas, and the sediment deposits therein, shall be protected from erosion after the impounding capability has been eliminated by the breaching of the dam.

9.6.2. Silt deposits and barren areas in the reservoir shall be stabilized and revegetated.

9.6.3. Disturbed areas, including the faces on any remaining embankment, must be protected by vegetation or other means approved by the director.

9.6.4. A channel in the reservoir sediment may be required by the director in order to reestablish a stream channel.

9.6.5. Permanent sediment basins, subject to ongoing maintenance, may be required by the director if the dam owner

cannot demonstrate the effectiveness of other structural and vegetative measures in stabilizing the reservoir area and dam site.

9.7. Placement of Earthen Material. Material removed from the dam shall be placed in waste disposal areas delineated in the approved plan package. The material shall be graded and compacted as necessary and stabilized from erosion by vegetation or other means approved by the director.

9.8. Placement of Non-Earthen Material. Concrete rubble and other rock material shall be placed in waste disposal areas delineated in the approved plan package. The material shall be placed in a manner to reduce hazardous conditions; protruding metal, wire, or bars are prohibited. The requirements of Section 8.1.14 of these regulations shall apply to the disposal of any other waste materials generated by the breaching operation.

9.9. Galleries and Drains. The effect of flows through the breach and backwater pressure on galleries and drains shall be evaluated. The galleries and drains shall be vented or sealed as necessary to prevent failure of the remaining structure.

9.10. Safety of Remaining Structure. The remaining structure shall have sufficient strength to support the maximum hydraulic loading without failure. The engineer shall attempt to reduce or eliminate hazards associated with an "attractive nuisance."

9.11. Construction Practices. The requirements of Section 8 of these regulations shall apply when breaching a dam unless clearly not applicable to the breaching operation; however, the director reserves the right to specify which requirements are applicable.

§47-34-10. Removal of a Dam.

10.1. Application to Remove a Dam. The owner of a dam must obtain a certificate of approval from the director prior to the removal of the dam. A complete application in accordance with the provisions of Section 5.1 of these regulations must be submitted to and approved by the director prior to the commencement of removal activities.

10.1.1. Plan Package Requirements. The plan package submitted in order to remove a dam shall be in accordance with the applicable requirements of Section 6 of these regulations and must also include the specific requirements delineated in Sections 10.2 through 10.8 of these regulations. Narratives, plans, or specifications required under Section 6 of these regulations which are clearly not applicable to the proposed removal activities may be omitted from the submittal; however, the director reserves the right to specify those items which must be included in the removal plan package.

10.2. Removal Requirements. Removal of a dam shall consist of the complete removal of the structure to the original ground except in special cases where it may be necessary or advantageous to leave small sections of the structure. Unless otherwise approved by the director, the removal of a dam shall consist of complete removal of the structure to approximate original contour. A total of no more than ten percent (10%) of the length of the structure may remain at the abutment areas.

10.3. Safety. Reservoirs shall be completely drained before removal operations begin. Removal work should be scheduled during dry weather using National Weather Service advice, and then proceed quickly to reduce the potential for impounding reservoir water.

10.4. Blasting. If blasting is to be used in the removal of a dam, a blasting plan shall be submitted to the director for approval. The plan shall include distance to existing structures and the measures that will be taken to minimize air blast and flying materials. A pre-blast survey of existing nearby structures and water wells which may be affected by blasting may be necessary.

10.5. Erosion and Sediment Control. Erosion and sediment control measures sufficient to comply with the provisions of Section 8.1.13 of these regulations shall be implemented during the removal operation. The following measures shall also be implemented:

10.5.1. Reservoir areas, and the sediment deposits therein, shall be protected from erosion after the impounding capability has been eliminated by the removal of the dam.

10.5.2. Silt deposits and barren areas in the reservoir shall be stabilized and revegetated.

10.5.3. Disturbed areas, including the faces on any remaining embankment, must be protected by vegetation or other means approved by the director.

10.5.4. A channel in the reservoir sediment may be required by the director in order to reestablish a stream channel.

10.5.5. Permanent sediment basins, subject to ongoing maintenance, may be required by the director if the dam owner cannot demonstrate the effectiveness of other structural and vegetative measures in stabilizing the reservoir area and dam site.

10.6. Placement of Earthen Material. Material removed from the dam shall be placed in waste disposal areas delineated in the approved plan package. The material shall be graded and compacted as necessary and stabilized from erosion by vegetation or other means approved by the director.

10.7. Placement of Non-Earthen Material. Concrete rubble and other rock material shall be placed in waste disposal areas delineated in the approved plan package. The material shall be placed in a manner to reduce hazardous conditions; protruding metal, wire, or bars are prohibited. The requirements of Section 8.1.14 of these regulations shall apply to the disposal of any other waste materials generated by the removal operation.

10.8. Safety of Remaining Structure. If any portion of the structure remains, that portion shall have sufficient strength to support the maximum hydraulic loading without failure. The engineer shall attempt to reduce or eliminate hazards associated with an "attractive nuisance."

10.9. Construction Practices. The requirements of Section 8 of these regulations shall apply when removing a dam unless clearly not applicable to the removal operation; however, the director reserves the right to specify which requirements are applicable.

§47-34-11. Abandonment of a Dam.

11.1. Application to Abandon a Dam. The owner of a dam must obtain a certificate of approval from the director prior to the abandonment of the dam. A complete application in accordance with the provisions of Section 5.1 of these regulations must be submitted to and approved by the director prior to the commencement of abandonment activities.

11.2. Reservoir Elimination. The reservoir area shall be completely filled to the crest elevation of the dam with approved material to eliminate the impoundment of water. The maximum impounding capacity upon completion of final grading shall not exceed one (1) acre-foot of impounding capacity. The final top elevation of the reservoir fill shall be higher than, and sloped into, the diversion system required under Section 11.4 of these regulations.

11.3. Embankment Stability. The remaining embankment shall be shown to achieve a minimum factor of safety in accordance with the provisions of Section 7.4.2.a.C of these regulations.

11.4. Diversion System. A diversion system designed for a P100 rainfall event shall be provided to capture the stream at the upstream end of the reservoir and convey stream water and embankment runoff water around the site. The diversion system shall outlet safely beyond the downstream toe of the embankment in a natural drainway capable of carrying the design storm without excessive erosion. The director may require the installation of an energy dissipator in accordance with the provisions of Section 7.4.2.d.B.(b)(F) of these regulations.

11.5. Sealing Conduits. All conduits through the embankment, with the exception of underdrain conduits, shall be sealed with

concrete at the upstream end prior to elimination of the reservoir. The director may require pressure testing of conduits to determine seal adequacy.

11.6. Erosion and Sediment Control. Erosion and sediment control measures sufficient to comply with the provisions of Section 8.1.13 of these regulations shall be implemented during the abandonment operation.

11.7. Soil and Vegetative Cover. A sufficient layer of topsoil shall be provided to permit long-term growth of vegetation. A seeding and mulching mixture shall be proposed in the abandonment application to accomplish revegetation of the project area.

11.8. Retention of Jurisdiction. The director shall retain jurisdiction over the site for a minimum period of five (5) years after abandonment, during which time the dam and its appurtenances shall be inspected annually by an engineer experienced in such inspections. A report shall be filed with the director detailing the findings of each inspection and describing intended maintenance work. Should a major storm occur, a similar report shall be filed to detail the resultant condition of the structure.

11.9. Final Approval of Abandonment. At the completion of the five-year period, a final joint inspection by the engineer and the director shall be conducted to determine the effectiveness of the abandonment design and the potential need for continued maintenance. Should the director determine as a result of this inspection that an additional inspection time period or maintenance work is required, a letter detailing these requirements shall be sent to the owner. Should the director determine as a result of the inspection that the abandonment design has been effective, a letter of acceptance shall be issued stating that the dam has been properly abandoned.

§47-34-12. Reduction or Enlargement of a Dam.

12.1. Reduction of Dam Height To Less Than Jurisdiction.

12.1.1. A person planning to reduce the height of a dam so that the remaining structure will no longer meet the definition of "dam" set forth in Section 2.6 of these regulations must obtain a certificate of approval from the director.

12.1.2. A complete application in accordance with the provisions of Section 5.1 of these regulations must be submitted to and approved by the director prior to the commencement of reduction activities. The application must also contain information showing that the remaining impounding structure will not cause loss of life or appreciable property damage downstream should that structure fail.

12.1.2.a. Plan Package Requirements. The plan package submitted in order to reduce the height of a dam shall be in accordance with the applicable requirements of Section 6 of these regulations and must also include the specific requirements delineated in Sections 12.1.3 and 12.1.4 of these regulations. Narratives, plans, or specifications required under Section 6 of these regulations which are clearly not applicable to the proposed reduction may be omitted from the submittal; however, the director reserves the right to specify those items which must be included in the reduction plan package.

12.1.3. The remaining structure shall have a properly designed spillway system capable of passing a Class A design storm without overtopping.

12.1.4. The remaining structure shall achieve a factor of safety in accordance with the provisions of Section 7.4.2.a.C or 7.4.2.b.B of these regulations as appropriate to the type of structure.

12.1.5. The requirements of Section 8 of these regulations shall apply when reducing the height of a dam unless clearly not applicable to the reduction operation; however, the director reserves the right to specify which requirements are applicable.

12.1.6. The director shall retain jurisdiction over the remaining structure until the reduction operation is completed and a letter of acceptance has been issued by the director.

12.2. Enlargement of a Structure to Jurisdiction.

12.2.1. A person planning to enlarge an existing structure so that the completed structure will meet the definition of "dam" set forth in Section 2.6 of these regulations must obtain a certificate of approval from the director.

12.2.2. A complete application in accordance with the provisions of Section 5.1 of these regulations must be submitted to and approved by the director prior to the commencement of enlargement activities.

12.2.2.a. Plan Package Requirements. The plan package submitted in order to enlarge a structure to jurisdiction shall be in accordance with the applicable requirements of Section 6 of these regulations. Narratives, plans, or specifications required under Section 6 of these regulations which are clearly not applicable to the proposed enlargement may be omitted from the submittal; however, the director reserves the right to specify those items which must be included in the enlargement plan package.

12.2.3. The director will require adequate drilling and testing of the existing structure and foundation to ascertain in-place conditions.

12.2.4. The requirements of Section 8 of these regulations shall apply when enlarging a structure to jurisdiction unless clearly not applicable to the enlargement operation; however, the director reserves the right to specify which requirements are applicable.

§47-34-13. Dams Completed Before July 1, 1973.

13.1. Complete Application Required. An application for a certificate of approval shall be submitted to the director for all dams completed before July 1, 1973 which meet the definition of "dam" set forth in Section 2.6 of these regulations. If the engineer can demonstrate that the dam meets the design requirements specified in these regulations, an application for approval of an existing dam should be submitted. If the dam requires modification to meet the requirements, an application for modification of an existing dam should be submitted. If the above options are not exercised by the dam owner, an application to breach, remove, or properly abandon the dam pursuant to these regulations shall be submitted.

13.2. Performance Requirements. To receive a certificate of approval, all dams completed before July 1, 1973 shall meet the applicable design requirements of Section 7 of these regulations. Those dams which do not meet the design requirements of Section 7 of these regulations shall be modified, breached, removed, or properly abandoned pursuant to the provisions of these regulations.

13.3. Plan Package Requirements. The plan package submitted for approval or modification of an existing dam shall be in accordance with applicable requirements of Section 6 of these regulations, except that testing and analysis results may be substituted for design specifications. If as-built drawings are not available, the engineer may substitute drawings prepared by him which represent the existing conditions at the dam as determined through the testing and analysis program.

§47-34-14. Sale or Transfer of a Dam.

14.1. Notification and Documentation. Within thirty (30) days after the sale or transfer of a dam, the director must be notified of that transaction by the person who was issued the certificate of approval for the dam.

14.1.1. The seller of a dam must provide the following documentation to the director:

14.1.1.a. The name and address of new owner;

14.1.1.b. A copy of the signed agreement between the previous and new owner acknowledging certificate of approval responsibility and including any warranties, insurance coverage, or liability agreements between the parties;

14.1.1.c. The effective date of the ownership or responsibility transfer; and

14.1.1.d. Documentation that a copy of the certificate of approval -- or the most recent Dam Control Act Notice or Order if a valid certificate of approval does not exist -- has been entered in the deed or land records of the county in which the dam is located.

14.1.2. The director may reissue a corrected certificate of approval reflecting the sale or transfer of a dam upon the receipt of appropriate documentation and fees.

§47-34-15. Dam Operations and Safety.

15.1. Safe Operations. The owner of a dam shall ensure that his dam is operated in a safe and responsible manner so as not to endanger life or property.

15.2. Operations Plan. Owners of dams which require the operation of gates, penstocks, or other means of regulating the reservoir level or downstream flow shall develop and submit an operations plan to the director for approval.

15.2.1. Plan Contents. The operations plan shall include, but not be limited to, normal and seasonal operational procedures for gates, penstocks, and other reservoir or downstream flow regulating devices. The name, address, and telephone number of each individual authorized to operate the dam shall also be included in the plan.

15.2.2. Plan Implementation. The operations plan shall be implemented immediately upon approval by the director and shall be updated periodically as necessary to reflect any changes in personnel or operation procedures.

15.3. Releasing Water. The owner of a dam may release water or lower the reservoir elevation through the use of gates without prior approval of the director provided that the release of water will not adversely affect the dam structure, property, or water quality or pose a hazard to human life.

15.3.1. Emergency Releases of Water. Under emergency conditions, the owner of a dam may release water at a rate which may violate the criteria established under Section 15.3 of these regulations provided that such emergency release will not pose ~~a~~ an unjustifiable hazard to human life. Notification must be given of a pending emergency release of water in accordance with the provisions of Section 15.8.1 of these regulations. In accordance with the provisions of W. Va. Code §20-5D-13, this regulatory provision shall not relieve the owner of the dam of any liabilities resulting from an emergency release of water.

15.3.2. Low Flow Augmentation. The director may require the owner of a dam to maintain a specified stream flow below the dam or to augment the stream flow for appropriate in-stream uses.

15.4. Dam Safety Inspections. Periodic inspections of dams shall be performed to monitor and assess the condition of the dam. These scheduled safety inspections of completed dams shall be in the charge of an engineer.

15.4.1. Inspections by the Dam Owner. The owner of a dam or his agent shall perform safety inspections monthly or more frequently. Such inspections must survey the dam and its appurtenances to check for problems or changes since the last inspection. The owner or his agent shall inspect the dam more frequently than once per month during adverse weather conditions. The owner shall report any observed problems to the director.

15.4.2. Inspections by the Director. The director may inspect any dam at any time in accordance with the provisions of W. Va. Code §20-5D-4(i).

15.4.3. Inspections by the Owner's Engineer. An engineering inspection shall be conducted annually for three (3) years after the completion of any dam, in accordance with the provisions of Section 8.3.4 of these regulations. Upon the conclusion of this three-year period, the dam shall be inspected by the owner's engineer at the frequency specified in Sections 15.4.3.a through 15.4.3.c of these regulations as appropriate to the hazard classification of the dam. The director may require additional inspections based upon site conditions. The director reserves the right to attend any inspection and require prior notification of the inspection from the owner of the dam.

15.4.3.a. Class A dams shall be inspected at least once every five (5) years.

15.4.3.b. Class B dams shall be inspected at least once every three (3) years.

15.4.3.c. Class C dams shall be inspected at least once every two (2) years.

15.4.4. Inspection of Dams with Serious Problems. The director may establish the frequency of inspection of dams with serious problems for both inspections by the dam owner under Section 15.4.1 of these regulations and inspections by the owner's engineer under Section 15.4.3 of these regulations. The inspection of a dam with serious problems shall monitor slopes, seepage, bulges, scarps, vertical displacement, excessive erosion, piping, sudden changes in monitoring devices, and other visible factors which could indicate potential failure of the embankment, spillways, or other appurtenances. The director reserves the right to attend any inspection and require prior notification of the inspection by the owner of the dam.

15.5. Dam Safety Inspection Reports.

15.5.1. Inspection Reports for Completed Dams. A written report containing the observations of each inspection that is required under Sections 8.3.4 and 15.4.3 of these regulations shall be submitted to the director by the dam owner within thirty (30) days of the inspection. The report shall also describe maintenance work to be performed as a result of the inspection findings. ~~Should a major storm occur,~~ Should a storm equal to or greater than a 50-year, 6-hour rainfall event occur, a similar report shall be filed to detail the resultant condition of the structure. Certification by an engineer shall be submitted to the director with each inspection report to verify that the dam and its appurtenances are functioning as designed.

15.5.2. Inspection Reports for Dams with Serious Problems. A written report containing the observations of each inspection required under Section 15.4.4 of these regulations shall be submitted to the director by the dam owner within thirty (30) days of the inspection.

15.6. Monitoring Plans. Owners of Class C dams shall formulate and submit a monitoring plan to the director for approval. Owners of Class A and Class B dams may be required by the director to formulate and submit a monitoring plan for approval.

15.6.1. The monitoring plan developed by the ~~owner of a dam~~ dam owner must follow the format of the example plan provided by the director and shall include, but not be limited to, the following:

15.6.1.a. A description of the dam, including appropriate drawings and location maps;

15.6.1.b. A listing of problems and deficiencies and any implemented repairs;

15.6.1.c. The inspection frequency under varying weather conditions;

15.6.1.d. A description of areas or items to be inspected;

15.6.1.e. Corrective actions to be taken;

15.6.1.f. The responsible persons' names, addresses, and telephone numbers;

15.6.1.g. The method of notification of the director and ~~emergency agencies~~ county emergency services authorities; and

15.6.1.h. Other items required by the director based upon site-specific conditions.

15.6.2. Monitoring plans shall be updated annually. More frequent updating of the plans may be required by the director based upon rapidly changing personnel or site conditions. The monitoring plan shall be implemented immediately by the dam owner upon the approval of the plan by the director.

~~15.7.--Emergency-Warning-Plans.---In-addition-to-the-provisions of--W.-Va.-Code-§20-5D-10,--owners--of-Class-C-dams-shall-have-the responsibility--of--coordinating--with--county--emergency--service authorities--for-development-of-evacuation-plans.--Inundation-maps required-under-Section--3.5.3.b--of--these--regulations--shall--be provided--to-county-emergency-service-authorities.--The-evacuation plans-should-follow-the-format-of-the-example-plan-provided-by-the director.--Dam--owners--shall--inform--county--emergency--services authorities--of--the--proposed--or--existing--monitoring--plan-and provide-the-county-with-updates-of-the--monitoring--plan--as--such updates-are-approved-by-the-director.~~

15.7. Emergency Action Plans. Owners of Class C dams shall formulate and submit an emergency action plan to the director for approval. Owners of Class A and Class B dams may be required by the director to formulate and submit an emergency action plan for approval.

15.7.1. The emergency action plan developed by the dam owner must follow the format of the example plan provided by the director.

15.7.2. The dam owner shall coordinate with county emergency service authorities in the development of the emergency action plan. The dam owner must provide copies of the inundation maps required under Section 3.5.3.b of these regulations to those authorities.

15.7.3. The dam owner shall provide county emergency services authorities with a copy of the monitoring plan, and all updates of that plan, approved by the director pursuant to Section 15.6 of these regulations.

15.8. Emergency Procedures.

~~15.8.1.--Emergency--Condition.----If--the--owner--of--a--dam determines--that--an--emergency--exists,--in--accordance--with-the provisions-of-W.-Va.-Code-§20-5D-10,-it-is-his--responsibility--to notify-any-persons-who-may-be-endangered-if-the-dam-should-fail.~~

15.8.1. Emergency Condition. If the owner of a dam determines that an emergency exists, he shall immediately notify any person who may be endangered if the dam should fail and then notify the appropriate county emergency services authorities and the director. After providing notification of the emergency condition, the owner shall immediately take any remedial action, such as an emergency release of water, that is necessary to protect life and property.

15.8.2. Dangerous Condition. Should a dangerous condition develop, the director shall be informed immediately. The owner of the dam shall immediately take any remedial action necessary to protect life and property. Emergency procedures developed in accordance with the provisions of Sections 15.6 and 15.7 of these regulations shall be implemented to protect life and property downstream. The site shall be inspected and monitored at least once every eight (8) hours until the emergency situation is alleviated. Continuous monitoring may be required by the director when there is an imminent danger to the health, safety, or welfare of the public.

15.8.3. Evaluation of Dangerous Conditions. If a dangerous condition develops, an engineering evaluation shall be initiated as soon as possible to formulate a plan for permanent correction of the dangerous condition. The evaluation and corrective action plan shall be submitted to and approved by the director prior to implementation.

~~15.9.--Dam-Owner-Not-Relieved-of-Responsibility.--Approval-of-a monitoring--plan--under--Section--15.6-of-these-regulations-and-an emergency--warning-plan-of-Section-15.7-of-these-regulations-shall not-relieve-the-owner-of-the-dam-of-his-legal-duties,-obligations, or-liabilities-under-W.-Va.-Code-§§20-5D-10-and-20-5D-13.~~

15.9. Dam Owner Not Relieved of Responsibility. The director's approval of a monitoring plan, or updates to such a plan, pursuant to Section 15.6 of these regulations or his approval of an emergency action plan pursuant to Section 15.7 of these regulations shall not relieve the dam owner of his legal duties, obligations, or liabilities under W. Va. Code §§20-5D-10 and 20-5D-13.

§47-34-16. Dam Maintenance.

16.1. General Maintenance Requirements.

16.1.1. Required Maintenance. Each dam shall be maintained in accordance with the plans and specifications approved under the applicable certificate of approval. The director may require maintenance to be performed on a dam, whether or not a certificate of approval has been issued for that dam.

16.1.2. Maintenance Plan. Owners of dams shall formulate and submit a written maintenance plan to the director for approval. The maintenance plan shall include, but not be limited to, schedules for maintaining embankments, concrete structures, vegetative or rock covers, gates, gate mechanisms, penstocks, or other reservoir-regulating devices, spillways, and appurtenances. The maintenance plan shall be implemented immediately by the dam owner upon the approval of the plan by the director. The maintenance plan shall be updated periodically as necessary to reflect changing site conditions.

16.2. Specific Maintenance Requirements.

16.2.1. All spillways and appurtenances shall be maintained to operate in accordance with the plans and specifications approved under the applicable certificate of approval.

16.2.2. All failures resulting from landslides or slope failures shall be corrected immediately if the failures significantly affect the safety or design capacity of the dam or its appurtenances. All failures shall be reported to the director.

16.2.3. All pipes shall be repaired or replaced when damaged, distorted, or if they otherwise fail to function properly in accordance with the plans and specifications approved under the applicable certificate of approval.

16.2.4. Leakage through joints, fissures, and cracks through or under the spillway channel shall be immediately investigated and repaired.

16.2.5. Any new gate which has been installed in a new dam or in the repair or modification of an existing dam, or any gate which has been opened within five (5) years prior to inspection by the director, shall be opened to at least thirty-three percent (33%) of its maximum capacity at least once annually. Gates not meeting the above requirements may remain closed until operated for the purposes of the owner or to alleviate an emergency condition and shall thereafter be opened at least once annually. All gate mechanisms shall be lubricated annually regardless of the operational status of the gate.

16.3. Routine Maintenance.

16.3.1. Routine maintenance of spillways shall be performed. Such maintenance shall include the removal of sediment, brush, trees, obstructions, and rocks in stilling basins and the re-establishment of the structure to its original hydraulic design.

16.3.2. Routine inspections shall be made of all hydraulic structures in order to maintain proper operation. Special inspections shall be conducted whenever a significant flow through the structures has occurred.

16.3.3. If erosion on the embankment face or abutments occurs, the area shall be regraded and be provided with adequate drainage control or revegetation to prevent future occurrences.

16.3.4. All concrete structures and channel linings shall be maintained in accordance with the plans and specifications approved under the applicable certificate of approval. All cracks located in concrete channels shall be sealed immediately with a sealant approved by the director.

16.3.5. Access roads shall be maintained in order to provide access for emergency inspections, vehicles, and equipment.

16.3.6. The embankment or concrete structure of a dam shall be kept clear of trees and shrubs. The downstream toe and abutments of the dam shall be cleared to natural ground for a lateral distance of at least twenty-five (25) feet. All dams with vegetative covers shall be mowed at least once annually. Grazing by farm animals shall be controlled to prevent animal trails or other damage to the vegetative cover.

16.3.7. The embankment shall be kept clear of burrowing animals.

16.3.8. All monitoring devices shall be routinely inspected and repaired or replaced as necessary so that the devices function properly.

§47-34-17. Dam Repairs.

17.1. General Repair Requirements. The director may require repairs to be performed on a dam, whether or not the dam has a certificate of approval. Major repairs shall require a certificate of approval, issuance of which may or may not constitute final approval of the dam, as determined by the director.

17.1.1. Routine Repairs (No Certificate Required). Repairs conducted in accordance with the provisions of Section 16.3 of these regulations shall not normally require an application for a certificate of approval; however, the director may require such an application based upon site-specific conditions.

17.1.2. Major Repairs (Certificate Required). Any repairs to a dam other than routine repairs listed in Section 16.3 of these regulations shall require an application for a certificate of approval in accordance with the provisions of these regulations.

17.2. Specific Repair Requirements.

17.2.1. Removal of Trees and Tree Roots. All trees shall be removed from the embankment and abutment areas, unless otherwise approved by the director based upon site-specific conditions. Small trees with a base diameter of four (4) inches or less may be removed without removing the root system unless specific problems with the root system are evident. Larger trees may require special care in removal. The director may require the removal of root systems of large trees if the potential for seepage along the root system exists. If removal of root systems requires extensive excavation of the embankment, the removal shall be considered a major repair requiring a complete application for a certificate of approval.