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**COMMONWEALTH of VIRGINIA**

**Virginia Impounding Structures  
Regulations (Dam Safety)**

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Department of Conservation and Recreation  
Division of Dam Safety and Floodplain Management  
203 Governor Street, Suite 206  
Richmond, VA 23219-2094  
(804) 371-6095



Virginia Department of Conservation & Recreation  
State Parks • Soil & Water Conservation • Natural Heritage  
Chesapeake Bay Local Assistance • Land Conservation  
Outdoor Recreation Planning • Dam Safety & Floodplains

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REGULATIONS (§4VAC50-20)**

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# VIRGINIA IMPOUNDING STRUCTURE REGULATIONS (§ 4 VAC 50-20)

## Part I: General

### 4VAC50-20-10. Authority.

This chapter is promulgated by the Virginia Soil and Water Conservation Board in accordance with the provisions of the Dam Safety Act, Article 2, Chapter 6, Title 10.1 (§10.1-604 et seq.), of the Code of Virginia.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §1.1, eff. February 1, 1989.

### 4VAC50-20-20. General provisions.

A. This chapter provides for the proper and safe design, construction, operation and maintenance of impounding structures to protect public safety. This chapter shall not be construed or interpreted to relieve the owner or operator of any impoundment or impounding structure of any legal duties, obligations or liabilities incident to ownership, design, construction, operation or maintenance.

B. Approval by the board of proposals for an impounding structure shall in no manner be construed or interpreted as approval to capture or store waters. For information concerning approval to capture or store waters, see Chapter 8 (§62.1-107) of Title 62.1 of the Code of Virginia, and other provisions of law as may be applicable.

C. In promulgating this chapter, the board recognizes that no impounding structure can ever be completely "fail-safe," because of incomplete understanding of or uncertainties associated with natural (earthquakes and floods) and manmade (sabotage) destructive forces; with material behavior and response to those forces; and with quality control during construction.

D. Any engineering analysis required by this chapter such as plans, specifications, hydrology, hydraulics and inspections shall be conducted by and bear the seal of a professional engineer licensed to practice in Virginia.

E. The official forms as called for by this chapter are available from the director.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §1.2, eff. February 1, 1989.

### 4VAC50-20-30. Definitions.

The following words and terms when used in this chapter shall have the following meanings unless the context clearly indicates otherwise:

"Acre-foot" means a unit of volume equal to 43,560 cubic feet or 325,853 gallons (one foot of depth over one acre of area).

"Agricultural purpose dams" means dams which are less than 25 feet in height or which create a maximum impoundment smaller than 100 acre-feet and certified by the owner on official forms as constructed, maintained or operated primarily for agricultural purposes.

"Alteration permit" means a permit required for changes to an impounding structure that could alter or affect its structural integrity. Alterations requiring a permit include, but are not limited to: changing the height, increasing the normal pool or principal spillway elevation, changing the elevation or physical dimensions of the emergency spillway or removing the impounding structure.

"Board" means the Virginia Soil and Water Conservation Board.

"Conditional operation and maintenance certificate" means a certificate required for impounding structures with deficiencies.

"Construction permit" means a permit required for the construction of a new impounding structure.

"Design flood" means the calculated volume of runoff and the resulting peak discharge utilized in the evaluation, design, construction, operation and maintenance of the impounding structure.

"Design freeboard" means the vertical distance between the maximum elevation of the design flood and the top of the impounding structure.

"Director" means the Director of the Department of Conservation and Recreation or his designee.

"Height" means the structural height of an impounding structure. If the impounding structure spans a stream or watercourse, height means the vertical distance from the natural bed of the stream or watercourse measured at the downstream toe of the impounding structure to the top of the impounding structure. If the impounding structure does not span a stream or watercourse, height means the vertical distance from the lowest elevation of the outside limit of the barrier to the top of the impounding structure.

"Impounding structure" means a man-made device, whether a dam across a watercourse or other structure outside a watercourse, used or to be used to retain or store waters or other materials. The term includes: (i) all dams that are 25 feet or greater in height and that create an impoundment capacity of 15 acre-feet or greater, and (ii) all dams that are

six feet or greater in height and that create an impoundment capacity of 50 acre-feet or greater. The term "impounding structure" shall not include: (a) dams licensed by the State Corporation Commission that are subject to a safety inspection program; (b) dams owned or licensed by the United States government; (c) dams constructed, maintained or operated primarily for agricultural purposes which are less than 25 feet in height or which create a maximum impoundment capacity smaller than 100 acre-feet; (d) water or silt retaining dams approved pursuant to §45.1-222 or §45.1-225.1 of the Code of Virginia; or (e) obstructions in a canal used to raise or lower water.

"Impoundment" means a body of water or other materials the storage of which is caused by any impounding structure.

"Inundation zone" means an area that could be inundated as a result of impounding structure failure and that would not otherwise be inundated to that elevation.

"Life of the impounding structure" and "life of the project" mean that period of time for which the impounding structure is designed and planned to perform effectively, including the time required to remove the structure when it is no longer capable of functioning as planned and designed.

"Maximum impounding capacity" means the volume in acre-feet that is capable of being impounded at the top of the impounding structure.

"Normal impounding capacity" means the volume in acre-feet that is capable of being impounded at the elevation of the crest of the lowest ungated outlet from the impoundment.

"Operation and maintenance certificate" means a certificate required for the operation and maintenance of all impounding structures.

"Owner" means the owner of the land on which an impounding structure is situated, the holder of an easement permitting the construction of an impounding structure and any person or entity agreeing to maintain an impounding structure. The term "owner" includes the Commonwealth or any of its political subdivisions, including but not limited to sanitation district commissions and authorities. Also included are any public or private institutions, corporations, associations, firms or companies organized or existing under the laws of this Commonwealth or any other state or country, as well as any person or group of persons acting individually or as a group.

"Top of the impounding structure" means the lowest point of the nonoverflow section of the impounding structure.

"Watercourse" means a natural channel having a well-defined bed and banks and in which water flows when it normally does flow.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §1.3, eff. February 1, 1989; Amended, Virginia Register Volume 18, Issue 14, eff. July 1, 2002.

Effect of Amendment: The July 1, 2002 amendment revised the definitions for "director" and "impounding structure".

#### **4VAC50-20-40. Classes of impounding structures.**

A. Impounding structures shall be classified in one of four categories according to size and hazard potential, as defined in subsection B of this section and Table 1. Size classification shall be determined either by maximum impounding capacity or height, whichever gives the larger size classification.

B. For the purpose of this chapter, hazards pertain to potential loss of human life or property damage downstream from the impounding structure in event of failure or faulty operation of the impounding structure or appurtenant facilities.

1. Impounding structures in the Class I hazard potential category are located where failure will cause probable loss of life or serious damage to occupied building(s), industrial or commercial facilities, important public utilities, main highway(s) or railroad(s).
2. Impounding structures in the Class II hazard potential category are located where failure could cause possible loss of life or damage to occupied building(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important public utilities.
3. Impounding structures in Class III hazard potential category are located where failure may cause minimal property damage to others. No loss of life is expected.
4. Impounding structures in Class IV hazard potential category are located where the failure of the impounding structure would cause no property damage to others. No loss of life is expected.
5. Such size and hazard potential classifications shall be proposed by the owner and shall be subject to approval by the director. Present and projected development of the inundation zones downstream from the impounding structure shall be considered in determining the classification.
6. Impounding structures shall be subject to reclassification as necessary.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §1.4, eff. February 1, 1989.

**4VAC50-20-50. Performance standards required for impounding structures.**

Impounding structures shall be constructed, operated and maintained such that they perform in accordance with their design and purpose throughout the life of the project. For new impounding structures, the spillway(s) capacity shall perform at a minimum to safely pass the appropriate spillway design flood as determined in Table 1.

**TABLE 1--Impounding Structure Regulations**

Class of Dam	Hazard Potential If Impounding Structure Fails	SIZE CLASSIFICATION		Spillway Design Flood (SDF) <sup>b</sup>
		Maximum Capacity (Ac-Ft) <sup>a</sup>	Height(Ft) <sup>a</sup>	
I	Probable Loss of Life; Excessive Economic Loss	Large \$ 50,000	\$ 100	PMF <sup>c</sup>
		Medium \$ 1,000 & <50,000	\$ 40 & < 100	PMF
		Small \$ 50 & < 1,000	\$ 25 & < 40	1/2 PMF to PMF
II	Possible Loss of Life; Appreciable Economic Loss	Large \$ 50,000	\$ 100	PMF
		Medium \$ 1,000 & <50,000	\$ 40 & < 100	1/2 PMF to PMF
		Small \$ 50 & < 1,000	\$ 25 & < 40	100-YR to 1/2 PMF
III	No Loss of Life Expected; Minimal Economic Loss	Large \$ 50,000	\$ 100	1/2 PMF to PMF
		Medium \$ 1,000 & <50,000	\$ 40 & < 100	100-YR to 1/2 PMF
		Small \$ 50 & < 1,000	\$ 25 & < 40	50-YR <sup>d</sup> to 100-YR <sup>e</sup>
IV	No Loss of Life Expected; No Economic Loss to Others	\$ 50 (non-agricultural)	\$ 25 (both)	50-YR to 100-YR
		\$ 100 (agricultural)		

a. The factor determining the largest size classification shall govern.

b. The spillway design flood (SDF) represents the largest flood that need be considered in the evaluation of the performance for a given project. The impounding structure shall perform so as to safely pass the appropriate SDF. Where a range of SDF is indicated, the magnitude that most closely relates to the involved risk should be selected. The establishment in this chapter of rigid design flood criteria or standards is not intended. Safety must be evaluated in the light of peculiarities and local conditions for each impounding structure and in recognition of the many factors involved, some of which may not be precisely known. Such can only be done by competent, experienced engineering judgment, which the values in Table 1 are intended to supplement, not supplant.

c. PMF: Probable maximum flood. This means the flood that might be expected from the most severe combination of critical meteorologic and hydrologic conditions that are

reasonably possible in the region. The PMF is derived from the current probable maximum precipitation (PMP) available from the National Weather Service, NOAA. In some cases local topography or meteorological conditions will cause changes from the generalized PMP values; therefore, it is advisable to contact local, state or federal agencies to obtain the prevailing practice in specific cases.

d. 50-Yr: 50-year flood. This means the flood magnitude expected to be equaled or exceeded on the average of once in 50 years. It may also be expressed as an exceedence probability with a 2.0% chance of being equaled or exceeded in any given year.

e. 100-Yr: 100-year flood. This means the flood magnitude expected to be equaled or exceeded on the average of once in 100 years. It may also be expressed as an exceedence probability with a 1.0% chance of being equaled or exceeded in any given year.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §1.5, eff. February 1, 1989; Amended, Virginia Register Volume 18, Issue 14, eff. July 1, 2002.

Effect of Amendment: The July 1, 2002 amendment corrected the "greater than" and "equal than" signs in Table 1.

## **Part II: Permit Requirements**

### **4VAC50-20-60. Required permits.**

A. No person or entity shall construct or begin to construct an impounding structure until the board has issued a construction permit.

B. No person or entity shall alter or begin to alter an existing impounding structure in a manner which would potentially affect its structural integrity until the board has issued an alteration permit, or in the case of an emergency, authorization obtained from the director. The permit requirement may be waived if the director determines that the alteration of improvement will not substantially alter or affect the structural integrity of the impounding structure. Alteration does not mean normal operation and maintenance.

C. When the board receives an application for any permit to construct or alter an impounding structure, the director shall inform the government of any jurisdiction which might be affected by the permit application.

D. In evaluating construction and alteration permit applications the director shall use the most current design criteria and standards referenced in 4VAC50-20-320 of this chapter.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §2.1, eff. February 1, 1989.



#### **4VAC50-20-70. Construction permits.**

A. Prior to preparing the complete design report for a construction permit, applicants are encouraged to seek approval of the project concept from the director. For this purpose the applicant should submit a general description of subdivisions 1 through 4 of subsection B of this section and subdivisions 1 and 2 of this subsection:

1. Proposed design criteria and a description of the size, ground cover conditions, extent of development of the watershed and the geologic and the geotechnical engineering assumptions used to determine the foundations and materials to be used.
2. Preliminary drawings of a general nature, including cross sections, plans and profiles of the impounding structure, proposed pool levels and types of spillway(s).

B. An applicant for a construction permit shall submit a design report on official forms. The design report shall be prepared in accordance with 4VAC50-20-240 and shall include the following information:

1. A description of the impounding structure and appurtenances and a proposed classification conforming with this chapter. The description shall include a statement of the purposes for which the impoundment and impounding structure are to be used.
2. A description of properties located in the inundation zone downstream from the site of the proposed impounding structure, including the location and number of residential structures, buildings, roads, utilities and other property that would be endangered should the impounding structure fail.
3. A statement from the governing body of the local political subdivision or other evidence confirming that body is aware of the proposal to build an impounding structure and of the land use classifications applicable to the inundation zone.
4. Maps showing the location of the proposed impounding structure that include: the county or city in which the proposed impounding structure would be located, the location of roads, access to the site and the outline of the impoundment. Existing aerial photographs or existing topographic maps may be used for this purpose.
5. A report of the geotechnical investigations of the foundation soils or bedrock and of the materials to be used to construct the impounding structure.

6. Design assumptions and analyses sufficient to indicate that the impounding structure will be stable during its construction and during the life of the impounding structure under all conditions of reservoir operations, including rapid filling and rapid drawdown of the impoundment.
7. Evaluation of the stability of the reservoir rim area in order to safeguard against reservoir rim slides of such magnitude as to create waves capable of overtopping the impounding structure and confirmation of rim stability during seismic activity.
8. Design assumptions and analyses sufficient to indicate that seepage in, around, through or under the impounding structure, foundation and abutments will be reasonably and practically controlled so that internal or external forces or results thereof will not endanger the stability of the impounding structure.
9. Calculations and assumptions relative to design of the spillway or spillways. Spillway capacity shall conform to the criteria of Table 1.
10. Provisions to ensure that the impounding structure and appurtenances will be protected against deterioration or erosion due to freezing and thawing, wind and rain or any combination thereof.
11. Other pertinent design data, assumptions and analyses commensurate with the nature of the particular impounding structure and specific site conditions, including when required by the director, a plan and profile of the inundation zones.
12. Erosion and sediment control plans to minimize soil erosion and sedimentation during all phases of construction, operation and maintenance. Projects shall be in compliance with local erosion and sediment control ordinances.
13. A description of the techniques to be used to divert stream flow during construction so as to prevent hazard to life, health and property.
14. A plan of quality control testing to confirm that construction materials and methods meet the design requirements set forth in the specifications.
15. A proposed schedule indicating construction sequence and time to completion.
16. Plans and specifications as required by 4VAC50-20-310.
17. An emergency action plan on official forms and evidence that a copy of such plan has been filed with the local organization for emergency management and the State Department of Emergency Management. The plan shall include a

method of providing notification and warning to persons downstream, other affected persons or property owners and local authorities in the event of a flood hazard or the impending failure of the impounding structure.

18. A proposed impoundment and impounding structure operation and maintenance plan on official forms certified by a professional engineer. This plan shall include a safety inspection schedule and shall place particular emphasis on operating and maintaining the impounding structure in keeping with the project design, so as to maintain its structural integrity and safety during both normal and abnormal conditions which may reasonably be expected to occur during its planned life.

C. The director or the applicant may request a conference to facilitate review of the applicant's proposal.

D. The owner shall certify in writing that the operation and maintenance plan as approved by the board will be adhered to during the life of the project except in cases of unanticipated emergency requiring departure therefrom in order to mitigate hazard to life and property. At such time, the owner's engineer and the director shall be notified.

E. If the submission is not acceptable, the director shall inform the applicant within 60 days and shall explain what changes are required for an acceptable submission.

F. Within 120 days of receipt of an acceptable design report the board shall act on the application.

G. Prior to and during construction the owner shall notify the director of any proposed changes from the approved design, plans, specifications, or operation and maintenance plan. Approval shall be obtained from the director prior to the construction or installation of any changes that will affect the stability of the impounding structure.

H. The construction permit shall be valid for the construction schedule specified in the approved design report. The construction schedule may be amended by the director for good cause at the request of the applicant.

I. Construction must commence within two years after the permit is issued. If construction does not commence within two years after the permit is issued, the permit shall expire, except that the applicant may petition the board for extension of the two-year period and the board may extend such period for good cause.

J. The director may revoke a construction permit if any of the permit terms are violated, or if construction is conducted in a manner hazardous to downstream life or property. The director may order the owner to eliminate such hazardous conditions within a period of time limited by the order. Such corrective measures shall be at the owner's expense. The

applicant may petition the board to reissue the permit with such modifications as the board determines to be necessary.

K. The owner's professional engineer shall advise the director when the impounding structure may safely impound water. The director shall acknowledge this statement within 10 days after which the impoundment may be filled under the engineer's supervision. The director's acknowledgement shall act as a temporary operation and maintenance certificate until an operation and maintenance certificate has been applied for and issued in accordance with 4VAC50-20-110.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §2.2, eff. February 1, 1989; Amended, Virginia Register Volume 18, Issue 14, eff. July 1, 2002.

Effect of Amendment: The July 1, 2002 amendment, in the second sentence of subsection A, changed "items" to "subdivisions" twice, inserted "of this section" and "of this subsection", and deleted "below" after "1 and 2"; in subsections B and K, and in paragraph B 16, deleted "of this chapter" after the VAC citation; and, in paragraph B 17, inserted "organization for emergency management", inserted "the" before "State Department", and changed "Services" to "Management" after "Emergency".

#### **4VAC50-20-80. Alterations permits.**

A. Application for a permit to alter an impounding structure in ways which would potentially affect its structural integrity shall be made on official forms. The application shall clearly describe the proposed work with appropriately detailed plans and specifications.

B. Alterations which would potentially affect the structural integrity of an impounding structure include but are not limited to changing its height, increasing the normal pool or principal spillway elevation, changing the elevation or physical dimensions of the emergency spillway or removing the impounding structure.

C. Where feasible an application for an alteration permit shall also include plans and specifications for a device to allow for draining the impoundment if such does not exist.

D. If the submission is not acceptable, the director shall inform the applicant within 60 days and shall explain what changes are required for an acceptable submission.

E. Within 120 days of receipt of an acceptable application, the board shall act on the application.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §2.3, eff. February 1, 1989.

#### **4VAC50-20-90. Transfer of permits.**

Prior to the transfer of ownership of a permitted impounding structure the permittee shall notify the director in writing and the new owner shall file a transfer application on official forms. The new owner shall amend the existing permit application as necessary and shall certify to the director that he is aware of and will comply with all of the requirements and conditions of the permit.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §2.4, eff. February 1, 1989.

### **Part III: Certificate Requirements**

#### **4VAC50-20-100. Operation and maintenance certificates.**

A. A Class I Operation and Maintenance Certificate is required for a Class I Hazard potential impounding structure. The certificate shall be for a term of six years. It shall be updated based upon the filing of a new reinspection report certified by a professional engineer every two years.

B. A Class II Operation and Maintenance Certificate is required for a Class II Hazard potential impounding structure. The certificate shall be for a term of six years. It shall be updated based upon the filing of a new reinspection report certified by a professional engineer every three years.

C. A Class III Operation and Maintenance Certificate is required for a Class III Hazard potential impounding structure. The certificate shall be for a term of six years.

D. The owner of a Class I, II or III impounding structure shall provide the director an annual owner's inspection report on official forms in years when no professional reinspection is required and may be done by the owner or his representative.

E. If an Operation and Maintenance Certificate is not updated as required, the board shall take appropriate enforcement action.

F. The owner of a Class I, II or III impounding structure shall apply for the renewal of the six year operation and maintenance certificate 90 days prior to its expiration in accordance with 4VAC50-20-120 of this chapter.

G. A Class IV impounding structure will not require an operation and maintenance certificate. An inventory report is to be prepared as provided in 4VAC50-20-120 B and filed by the owner on a six-year interval, and an owners inspection report filed annually.

H. The owner of any impounding structure, regardless of its hazard classification, shall notify the board immediately of any change in either cultural features downstream from the impounding structure or of any change in the use of the area downstream that would present hazard to life or property in the event of failure.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §3.1, eff. February 1, 1989.

**4VAC50-20-110. Operation and maintenance certificate for newly constructed impounding structures.**

A. Within 180 days after completion of the construction of an impounding structure, the owner shall submit:

1. A complete set of as-built drawings certified by a professional engineer and an as-built report on official forms.
2. A copy of a certificate from the professional engineer who has inspected the impounding structure during construction certifying that, to the best of his judgment, knowledge and belief, the impounding structure and its appurtenances were constructed in conformance with the plans, specifications, drawings and other requirements approved by the board.
3. A copy of the operation and maintenance plan and emergency action plan submitted with the design report including any changes required by the director.

B. If the director finds that the operation and maintenance plan or emergency action plan is deficient, he shall return it to the owner within 60 days with suggestions for revision.

C. Within 60 days of receipt of the items listed in subsection A above, if the board finds that adequate provision has been made for the safe operation and maintenance of the impounding structure, the board shall issue an operation and maintenance certificate.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §3.2, eff. February 1, 1989.

**4VAC50-20-120. Operation and maintenance certificates for existing impounding structures.**

A. Any owner of an impounding structure other than a Class IV impounding structure which has already filed an inventory report that does not have an operation and maintenance certificate or any owner renewing an operation and maintenance certificate shall file an application with the board.

B. The application for an operation and maintenance certificate shall be on official forms and shall include:

1. A reinspection report for Class I and II impounding structures. The reinspection report shall include an update of conditions of the impounding structure based on a previous safety inspection as required by the board, a previous reinspection report or an as-built report.

2. An inventory report for Class III impounding structures. The inventory report shall include:

a. The name and location of the impounding structure and the name of the owner.

b. The description and dimensions of the impounding structure, the spillways, the reservoir and the drainage area.

c. The history of the impounding structure which shall include the design, construction, repairs, inspections and whether the structure has been overtopped.

d. Observations of the condition of the impounding structure, reservoir, and upstream and downstream areas.

e. Any changes in the impounding structure, reservoir, and upstream and downstream areas.

f. Recommendations for remedial work.

3. An impoundment and impounding structure operation and maintenance plan certified by a professional engineer. This plan shall place particular emphasis on operating and maintaining the impounding structure in keeping with the project design in such manner as to maintain its structural integrity and safety during both normal and abnormal conditions which may reasonably be expected to occur during its planned life. The safety inspection report required by the board should be sufficient to serve as the basis for the operation and maintenance plan for a Class I and Class II impounding structure. For a Class III impounding structure, the operation and maintenance plan shall be based on the data provided in the inventory report.

4. An emergency action plan and evidence that a copy of such plan has been filed with the local organization for emergency management and the State Department of Emergency Management. The plan shall include a method of providing notification and warning to persons downstream, other affected persons or

property owners and local authorities in the event of a flood hazard or the impending failure of the impounding structure.

C. The owner shall certify in writing that the operation and maintenance plan approved by the board will be adhered to during the life of the project except in cases of emergency requiring departure therefrom in order to mitigate hazard to life and property, at which time the owner's engineer and the director shall be notified.

D. If the director finds that the operation and maintenance plan or emergency action plan is deficient, he shall return it to the owner within 60 days with suggestions for revision.

E. Within 60 days of receipt of an acceptable application if the board finds that adequate provision has been made for the safe operation and maintenance of the impounding structure, the board shall issue an operation and maintenance certificate.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §3.3, eff. February 1, 1989; Amended, Virginia Register Volume 18, Issue 14, eff. July 1, 2002.

Effect of Amendment: The July 1, 2002 amendment, in paragraph B 1, substituted "previous safety inspection as required by the board" for "Phase I or Phase II inspection as established by the U.S. Army Corps of Engineers"; in the third sentence of paragraph B 3, substituted "safety inspection report required by the board" for "Phase I Inspection Report"; and, in paragraph B 4, substituted "local organization for emergency management and the State Department of Emergency Management" for "local and State Department of Emergency Services".

#### **4VAC50-20-130. Existing impounding structures constructed prior to July 1, 1982.**

A. Many existing impoundment structures were designed and constructed prior to the enactment of the Dam Safety Act, and may not satisfy current criteria for new construction. The board may issue an operation and maintenance certificate for such structures provided that:

1. Operation and maintenance is determined by the director to be satisfactory and up to date;
2. Annual owner's inspection reports have been filed with and are considered satisfactory by the director;
3. The applicant proves in accordance with the current design procedures and references of 4VAC50-20-320 to the satisfaction of the board that the impounding structure as designed, constructed, operated and maintained does not pose an unreasonable hazard to life and property; and
4. The owner satisfies all special requirements imposed by the board.

B. When appropriate with existing impounding structures only, the spillway design flood requirement may be reduced by the board to the spillway discharge at which dam failure



will not significantly increase the downstream hazard existing just prior to dam failure provided that the conditions of 4VAC50-20-130 A have been met.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §3.4, eff. February 1, 1989.

#### **4VAC50-20-140. Existing impounding structures constructed after July 1, 1982.**

The board may issue an operation and maintenance certificate for an impounding structure having a construction permit issued after July 1, 1982, and shall not require upgrading to meet new more stringent criteria unless the board determines that the new criteria must be applied to prevent an unreasonable hazard to life or property.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §3.5, eff. February 1, 1989.

#### **4VAC50-20-150. Conditional operation and maintenance certificate.**

A. During the review of any operation and maintenance application should the director determine that the impounding structure has deficiencies of a nonimminent danger category, the director may recommend that the board issue a conditional operation and maintenance certificate.

B. The conditional operation and maintenance certificate for Class I, II and III impounding structures shall be for a maximum term of two years. This certificate will allow the owner to continue normal operation and maintenance of the impounding structure, and shall require that the owner correct the deficiencies on a schedule determined by the director.

C. A conditional certificate may be renewed in accordance with the procedures of 4VAC50-20-120 provided that annual owner inspection reports are on file, and the board determines that the owner is proceeding with the necessary corrective actions.

D. Once the deficiencies are corrected, the board shall issue an operation and maintenance certificate based upon any required revisions to the original application.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §3.6, eff. February 1, 1989.

#### **4VAC50-20-160. Additional operation and maintenance requirements.**

A. The owner of an impounding structure shall not, through action or inaction, cause or allow such structure to impound water following receipt of a written report from the owner's engineer that the impounding structure will not safely impound water.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §3.7, eff. February 1, 1989.

#### **4VAC50-20-170. Transfer of certificates.**

Prior to the transfer of ownership of an impounding structure the certificate holder shall notify the director in writing and the new owner shall file a transfer application on official forms. The new owner may elect to continue the current operation and maintenance certificate for the remaining term or he may apply for a new certificate in accordance with 4VAC50-20-120. If the owner elects to continue the existing certificate he shall amend the existing certificate application as necessary and shall certify to the director that he is aware of and will comply with all of the requirements and conditions of the certificate.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §3.8, eff. February 1, 1989.

### **Part IV: Procedures**

#### **4VAC50-20-180. Inspections.**

The director may make inspections during construction, alteration or operation and maintenance as deemed necessary to ensure that the impounding structure is being constructed, altered or operated and maintained in compliance with the permit or certificate issued by the board. The director shall provide the owner a copy of the findings of these inspections. This inspection does not relieve the owner from the responsibility of providing adequate inspection during construction or operation and maintenance. Periodic inspections during construction or alteration shall be conducted under the supervision of a professional engineer who shall propose the frequency and nature of the inspections subject to approval by the director. Periodic inspections during operation and maintenance shall be conducted under the supervision of a professional engineer at an interval not greater than that required to update the operation and maintenance certificate. At a minimum, an annual owner's inspection shall be conducted when a professional inspection is not required. Every owner shall provide for an inspection by a professional engineer after overtopping of the impounding structure. A copy of the findings of each inspection with the engineer's recommendations shall be filed with the board within a reasonable period of time not to exceed 30 days subsequent to completion of the inspection.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §4.1, eff. February 1, 1989.

#### **4VAC50-20-190. Right to hearing.**

Any owner aggrieved by an action taken by the director or by the board without hearing, or by inaction of the director or the board, under the provisions of this chapter, may demand in writing a formal hearing.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §4.2, eff. February 1, 1989.

#### **4VAC50-20-200. Enforcement.**

Any owner refusing to obey any order of the board or the director pursuant to this chapter may be compelled to obey and comply with such provisions by injunction or other appropriate remedy obtained in a court proceeding. Such proceeding shall be instituted by the board or in the case of an emergency, by the director in the court which granted approval to the owner to impound waters or, if such approval has not been granted, the proceeding shall be instituted in any appropriate court.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §4.3, eff. February 1, 1989.

#### **4VAC50-20-210. Consulting boards.**

A. When the board needs to satisfy questions of safety regarding plans and specifications, construction or operation and maintenance, or when requested by the owner, the board may appoint a consulting board to report to it with respect to those questions of the safety of an impounding structure. Such a board shall consist of two or more consultants, none of whom have been associated with the impounding structure.

B. The costs and expenses incurred by the consulting board, if appointed at the request of an owner, shall be paid by the owner.

C. The costs and expenses incurred by the consulting board, if initiated by the board, shall be paid by the board.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §4.4, eff. February 1, 1989.

#### **4VAC50-20-220. Unsafe conditions.**

A. No owner shall have the right to maintain an impounding structure which unreasonably threatens the life or property of another person. The owner of any impounding structure found to have deficiencies which could threaten life or property if

uncorrected shall take the corrective actions needed to remove such deficiencies within a reasonable period of time.

B. Imminent danger. When the director finds that an impounding structure is unsafe and constitutes an imminent danger to life or property, he shall immediately notify the State Department of Emergency Management and confer with the owner. The owner of an impounding structure found to constitute an imminent danger to life or property shall take immediate corrective action to remove the imminent danger as required by §10.1-608 of the Code of Virginia.

C. Nonimminent danger. The owner of an impounding structure who has been issued a report by the board containing findings and recommendations for the correction of deficiencies which threaten life or property if not corrected, shall undertake to implement the recommendations for correction of deficiencies according to a schedule of implementation contained in that report as required by §10.1-609 of the Code of Virginia.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §4.5, eff. February 1, 1989; Amended, Virginia Register Volume 18, Issue 14, eff. July 1, 2002.

Effect of Amendment: The July 1, 2002 amendment, in subsection B, changed "Emergency Services" to "Emergency Management"; and, in subsection C, changed "director" to "board", following "issued a report by the".

#### **4VAC50-20-230. Complaints.**

A. Upon receipt of a complaint alleging that the person or property of the complainant is endangered by the construction, maintenance or operation of impounding structure, the director shall cause an inspection of the structure, unless the data, records and inspection reports on file with the board are found adequate to determine if the complaint is valid.

B. If the director finds that an unsafe condition exists, the director shall proceed under the provisions of §§10.1-608 and 10.1-609 of the Code of Virginia to render the extant condition safe.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §4.6, eff. February 1, 1989.

### **Part V: Design Requirements**

#### **4VAC50-20-240. Design of structures.**

A. The owner shall complete all necessary investigations prior to submitting the design report. The scope and degree of precision required is a matter of engineering judgment based on the complexities of the site and the hazard potential classification of the proposed structure.

B. Surveys shall be made with sufficient accuracy to locate the proposed construction site and to define the total volume of storage in the impoundment. Locations of center lines and other horizontal and vertical controls shall be shown on a map of the site. The area downstream and upstream from the proposed impounding structure shall be investigated in order to delineate the areas and extent of potential damage in case of failure or backwater due to flooding.

C. The drainage area shall be determined. Present, projected and potential future land-use conditions shall be considered in determining the runoff characteristics of the drainage area. The most severe of these conditions shall be included in the design calculations which shall be submitted as part of the design report.

D. The geotechnical engineering investigation shall consist of borings, test pits and other subsurface explorations necessary to adequately define the existing conditions. The investigations shall be performed so as to define the soil, rock and ground water conditions.

E. All construction materials shall be adequately selected so as to ensure that their properties meet design criteria. If on-site materials are to be utilized, they shall be located and determined to be adequate in quantity and quality.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §5.1, eff. February 1, 1989.

#### **4VAC50-20-250. Design flood.**

The minimum design flood to be utilized in impounding structure evaluation, design, construction, operation and maintenance shall be commensurate with the size and hazard potential of the particular impounding structure as determined in 4VAC50-20-50 and Table 1. Competent, experienced, professional engineering judgment shall be used in applying those design and evaluation procedures referenced in 4VAC50-20-320 of this chapter.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §5.2, eff. February 1, 1989.

#### **4VAC50-20-260. Emergency spillway design.**

A. Every impounding structure shall have a spillway system with adequate capacity to discharge the design flood without endangering the safety of the impounding structure.

B. An emergency spillway shall be required.

C. Vegetated earth or unlined emergency spillway may be approved when the applicant demonstrates that it will pass the spillway design flood without jeopardizing the safety of the impounding structure.

D. Lined emergency spillways shall include design criteria calculations, plans and specifications for open channel, drop, ogee and chute spillways that include crest structures, walls, panel lining and miscellaneous details. All joints shall be reasonably water-tight and placed on a foundation capable of sustaining applied loads without undue deformation. Provision shall be made for handling leakage from the channel or under seepage from the foundation which might adversely affect the structural integrity and structural stability of the impounding structure.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §5.3, eff. February 1, 1989.

#### **4VAC50-20-270. Principal spillways and outlet works.**

A. It will be assumed that principal spillways and regulating outlets provided for special functions will operate to normal design discharge capabilities during the spillway design flood, provided appropriate analyses show:

1. That control gates and structures are suitably designed to operate reliably under maximum heads for durations likely to be involved and risks of blockage by debris are minimal;
2. That access roads and passages to gate regulating controls would be safely passable by operating personnel under spillway design flood conditions; and
3. That there are no other substantial reasons for concluding that outlets would not operate safely to full design capacity during the spillway design flood.

B. If there are reasons to doubt that any of the above basic requirements might not be adequately met under spillway design flood conditions, the "dependable" discharge capabilities of regulating outlets shall be assumed to be less than 100% of design capabilities, generally as outlined in the following subsections C through G of this section.

C. Any limitations in safe operating heads, maximum velocities to be permitted through structures or approach channels, or other design limitations shall be observed in establishing "dependable" discharge rating curves to be used in routing the spillway design flood hydrograph through the reservoir.

D. If intakes to regulating outlets are likely to be exposed to dangerous quantities of floating drift, sediment depositions or ice hazards prior to or during major floods, the

dependable discharge capability during the spillway design flood shall be assumed to be zero.

E. If access roads or structural passages to operating towers or controls are likely to be flooded or otherwise unusable during the spillway design flood, the dependable discharge capability of regulating outlets will be assumed to be zero for those period of time during which such conditions might exist.

F. Any deficiencies in discharge performance likely to result from delays in the operation of gates before attendants could be reasonably expected to reach the control for in estimating "dependable" discharge capabilities to be assumed in routing the spillway design flood through reservoir. Reports on design studies shall indicate the allowances made for possible delays in initiating gate operations. Normally, for projects located in small basins, where critical spillway design flood inflows may occur within several hours after intense precipitation, outflows through any regulating outlets that must be opened after the flood begins shall be assumed to be zero for an appropriate period of time subsequent to the beginning of intense rainfall.

G. All gates, valves, conduits and concrete channel outlets shall be designed and constructed to prevent significant erosion or damage to the impounding structure or to the downstream outlet or channel.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §5.4, eff. February 1, 1989.

#### **4VAC50-20-280. Drain requirements.**

All new impounding structures regardless of their hazard potential classification, shall include a device to permit draining of the impoundment within a reasonable period of time as determined by the owner's professional engineer, subject to approval by the director.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §5.5, eff. February 1, 1989.

#### **4VAC50-20-290. Life of the impounding structure.**

Components of the impounding structure, the impoundment, the outlet works, drain system and appurtenances shall be durable in keeping with the design and planned life of the impounding structure.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §5.6, eff. February 1, 1989.

#### **4VAC50-20-300. Additional design requirements.**

- A. Flood routings shall start at or above the elevation of the crest of the lowest ungated outlet.
- B. All elements of the impounding structure and impoundments shall conform to sound engineering practice. Safety factors, design standards and design references that are used shall be included with the design report.
- C. Inspection devices may be required by the director for use by inspectors, owners or the director in conducting inspections in the interest of structural integrity during and after completion of construction and during the life of the impounding structure.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §5.7, eff. February 1, 1989.

#### **4VAC50-20-310. Plans and specifications.**

The plans and specifications for a proposed impounding structure shall consist of a detailed engineering design report that includes engineering drawings and specifications, with the following as a minimum:

1. The name of the project; the name of the owner; classification of the impounding structure as set forth in this chapter; designated access to the project and the location with respect to highways, roads, streams and existing impounding structures and impoundments that would affect or be affected by the proposed impounding structure.
2. Cross-sections, profiles, logs of test borings, laboratory and in situ test data, drawings of principal and emergency spillways and other additional drawings in sufficient detail to indicate clearly the extent and complexity of the work to be performed.
3. The technical provisions, as may be required to describe the methods of the construction and construction quality control for the project.
4. Special provisions, as may be required to describe technical provisions needed to ensure that the impounding structure is constructed according to the approved plans and specifications.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §5.8, eff. February 1, 1989.



#### **4VAC50-20-320. Acceptable design procedures and references.**

The following are acceptable as design procedures and references:

1. The design procedures, manuals and criteria used by the United States Army Corps of Engineers.
2. The design procedures, manuals and criteria used by the United States Department of Agriculture, Natural Resources Conservation Service.
3. The design procedures, manuals and criteria used by the United States Department of the Interior, Bureau of Reclamation.
4. The design procedures, manuals and criteria used by the United States Department of Commerce, National Weather Service.
5. Other design procedures, manuals and criteria that are accepted as current, sound engineering practices, as approved by the director prior to the design of the impounding structure.

Statutory Authority: §10.1-605 of the Code of Virginia.

Historical Notes: Derived from VR625-01-00 §5.9, eff. February 1, 1989; Amended, Virginia Register Volume 18, Issue 14, eff. July 1, 2002.

Effect of Amendment: The July 1, 2002 amendment, in paragraph 2, changed "Soil" to "Natural Resources" before "Conservation"; and, in paragraph 3, changed "or Interior" to "of the Interior".

### **FORMS**

Dam Owner's Annual Inspection Form, DCR 199-098 (rev. 12/01).

Operation and Maintenance Application Class I, II and III Impounding Structures, DCR 199-099 (rev. 12/01).

As-Built Report for Class I, II and III Impounding Structures, DCR 199-100 (rev. 12/01).

Design Report for the Construction/Alteration of Impounding Structures, DCR 199-101 (rev. 12/01).

Emergency Action Plan for Class I, Class II and Class III Impounding Structures, DCR 199-103 (rev. 12/01).

Inventory Report for Class III and Class IV Impounding Structures, DCR 199-104 (rev. 12/01).

Reinspection Report for Class I and II Impounding Structures, DCR 199-105 (rev. 12/01).

Agricultural Certification for Impounding Structures, DCR 199-106 (rev. 12/01).

Transfer Application for Impounding Structures, DCR 199-107 (rev. 12/01).



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