



# VIRGINIA SOIL AND WATER CONSERVATION BOARD GUIDANCE DOCUMENT ON THE DETERMINATION OF INSURANCE LEVELS IN ACCORDANCE WITH § 10.1- 605 OF THE *CODE OF* *VIRGINIA*

(Approved September 7, 2016)

## **Summary:**

This document serves to provide guidance to impounding structure owners regarding the establishment of appropriate insurance amounts to be carried by an owner that will substantially cover the costs of downstream property losses to others that may result from a dam failure. Such requirements are applicable to dam owners seeking reductions in spillway design capacity in accordance with the provisions of § 10.1-605 of the *Code of Virginia*. The document outlines procedures to be utilized to determine the flood zone that would require insurance coverage.

## **Electronic Copy:**

An electronic copy of this guidance in PDF format is available on the Regulatory Town Hall under the Virginia Soil and Water Conservation Board at <http://townhall.virginia.gov/L/GDocs.cfm>.

## **Contact Information:**

Please contact the Department of Conservation and Recreation's Division of Dam Safety and Floodplain Management at [dam@dcr.virginia.gov](mailto:dam@dcr.virginia.gov) or by calling 804-371-6095 with any questions regarding the application of this guidance.

## **Disclaimer:**

This document is provided as guidance and, as such, sets forth standard operating procedures for the Department of Conservation and Recreation in administering the Dam Safety Program on behalf of the Virginia Soil and Water Conservation Board. This guidance provides a general interpretation of the applicable Code and Regulations but is not meant to be exhaustive in nature. Each situation may differ and may require additional interpretation of the Dam Safety Act and attendant regulations. This guidance is not intended and cannot be relied on to create any rights, substantive or procedural, on the part of any person or entity.

## **Determination of Adequate Insurance Levels by Dam Owners When Applicable**

### **I. Background:**

Pursuant to Chapter 249 of the 2010 Virginia Acts of Assembly (SB276), § 10.1-506 of the *Code of Virginia* was amended to authorize an impounding structure to be determined to be in compliance with the spillway requirements of the impounding structure regulations provided that (i) the impounding structure will pass two-thirds of the reduced probable maximum precipitation

requirement (the 90 percent of the probable maximum precipitation) and (ii) the dam owner certifies annually that such impounding structure meets eight specified non-structural conditions including an updated emergency action plan, annual engineering inspections, and insurance for possible damage to downstream property.

In accordance with these conditions, for a dam owner to be found eligible for a reduced PMP requirement for spillway design, the owner shall, amongst several applicable conditions, certify that they are “insured in an amount that will substantially cover the costs of downstream property losses to others that may result from a dam failure”.

This guidance serves to clarify procedures that dam owners shall utilize to determine the flood zone that would require insurance coverage to comply with the provisions of § 10.1-506 of the *Code of Virginia*.

## **II. Definitions:**

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

"Dam break inundation zone" means the area downstream of a dam that would be inundated or otherwise directly affected by the failure of a dam.

"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.

"Height" means the structural height of a dam which is defined as the vertical distance from the natural bed of the stream or watercourse measured at the downstream toe of the dam to the top of the dam.

"Impounding structure" means a man-made structure, 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 twenty-five feet or greater in height and that create an impoundment capacity of fifteen acre-feet or greater, and (ii) all dams that are six feet or greater in height and that create an impoundment capacity of fifty 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 operated primarily for agricultural purposes which are less than twenty-five 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; or (e) obstructions in a canal used to raise or lower water.

"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" may include the Commonwealth or any of its political subdivisions, including but not limited to sanitation district commissions and authorities, 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.

"Spillway" means a structure to provide for the controlled release of flows from the impounding structure into a downstream area.

### **III. Authority:**

The Dam Safety Act (§ 10.1-604 et seq.) in the *Code of Virginia* contains the following authorities applicable to this guidance:

#### **§ 10.1-605. Promulgation of regulations by the Board; guidance document.**

B...1...g. The owner is insured in an amount that will substantially cover the costs of downstream property losses to others that may result from a dam failure; ...

4. Any dam owner who has submitted the certifications required by subdivisions 1 a through 1 h shall make (i) such certifications, (ii) the emergency action plan required by subdivision 1 a, and (iii) the certificate of insurance required by subdivision 1 g available, upon request and within five business days, to any person. A dam owner may comply with the requirements of this subdivision by providing the same information on a website and directing the requestor to such website. A dam owner who fails to comply with this subdivision shall be subject to a civil penalty pursuant to § 10.1-613.2.

#### **§ 10.1-606.2 Mapping of Dam Break Inundation Zones**

An owner of an impounding structure shall prepare a map of the dam break inundation zone for the impounding structure in accordance with criteria set out in the Virginia Impounding Structure Regulations (4VAC50-20)...

Appendix 1 contains the *Code of Virginia* authorities (extended) applicable to this Guidance and Appendix 2 contains the *Impounding Structure Regulations* authorities applicable to this Guidance. These include:

§ 10.1-605. Promulgation of regulations by the Board.

4VAC50-20-40. Hazard potential classifications of impounding structures.

4VAC50-20-50. Performance Standards Required for Impounding Structures

4VAC50-20-52. Incremental Damage Analysis.

4VAC50-20-53. Special Criteria for Reduced Sdf Requirement for Certain High Hazard Dams.

4VAC50-20-54. Dam break inundation zone mapping.

### **IV. Discussion and Interpretation:**

The requirement for a dam owner to carry insurance to cover the costs of downstream property losses is not a requirement that applies to all dam owners regulated in accordance with the Dam Safety Act [Article 2 (§ 10.1-604 et seq.) of Title 10.1 of the *Code of Virginia*]. It only applies to a limited set of high hazard dam owners that seek to maintain a Spillway Design Flood (SDF) capacity less than the 0.90 PMP standard set out in Table 1 of 4VAC50-20-50 of the Impounding Structure Regulations, in accordance with allowances provided within the law (§ 10.1-605) and the attendant regulations (4VAC50-20-50 and 4VAC50-20-53).

In accordance with § 10.1-605 of the *Code of Virginia*, the requirement is limited to those owners of a high hazard dam that are required to upgrade the spillway of their impounding structure to 0.90 probable maximum precipitation (PMP) (or at some PMP level in excess of 0.60 PMP in accordance with incremental methodologies) and that by choice of the owner, seek to comply with the conditions set out there-in that allow the spillway requirement to be reduced to two-thirds of the PMP requirement (0.60 PMP).

For this limited set of dam owners seeking the benefits of this provision of law, amongst the list of conditions that the dam owner must annually meet and certify to, is the requirement that “[t]he owner is insured in an amount that will substantially cover the costs of downstream property losses to others that may result from a dam failure”.

As the greatest magnitude of benefit to the dam owner due to the provisions of § 10.1-605 of the *Code of Virginia*, is a reduction in capacity from a maximum of 0.90 PMP down to 0.60 PMP it is reasonable to determine that it is the commensurate increase in risk to downstream property generated by the difference between the impounding structures spillway requirement (0.90) with dam failure or their incremental spillway design with dam failure and 0.60 PMP with dam failure or their actual spillway design with dam failure if greater, that insurance must be held for. This constitutes the applicable “range” (See Area of Insurance Valuation).

It is also relevant to note that this is limited to those downstream property losses that would result from a dam failure. This should be determined based on a worst case scenario where there is a complete failure of the structure with a failure time of no more than 30 minutes.

Within this range, insurance must be of a level to “substantially” cover the costs of downstream property losses to others. The list of properties that must be considered would include, but not be limited to, losses associated with residences, businesses, roadways and streets, personal property, public utilities, industrial or commercial facilities, railroads, and agricultural interests, not owned by the owner.

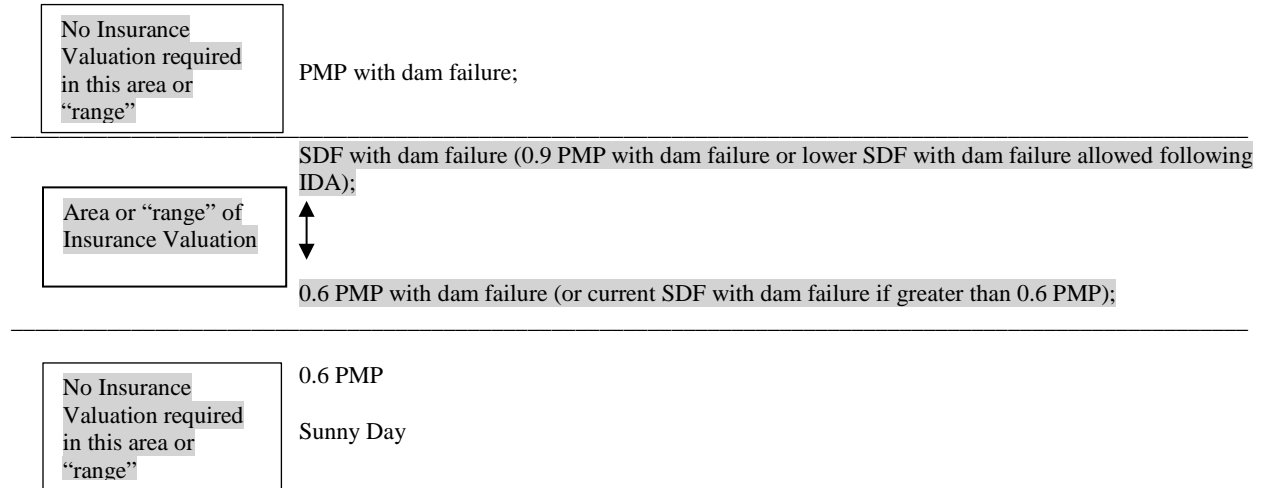
Any property or portion of a property that may sustain a loss, in accordance with the list outlined above, within the range shown on the dam break inundation zone map, must be insured. Dam failure impacts on traveling vehicles or other modes of active transport during flood conditions is considered likely to be minimal as the downstream population is “on alert.” Accordingly, impacts to modes of transport traveling these roadways or railways should be minimal and does not need to be included in insurance valuations. However, impacts to the roadways or railways within the range shown on the dam break inundation zone map must be insured.

An owner may further refine this list using methodologies set out in Section III of the United States Department of Interior, Bureau of Reclamation's ACER Technical Memorandum No. 11, 1988 at the owner’s discretion.

Dam break inundation zone maps generated in accordance with the provisions of 4VAC50-20-54 shall be used to identify those properties at risk of loss within this range (the area of insurance valuation). The area of insurance valuation (area 1) would represent the minimum area to

evaluated for insurance valuation purposed. At no time would the lower range need to consider a SDF less than 0.60 PMP with dam failure.


Area of Insurance Valuation (required dam break inundation zone analyses)



Once the properties outlined above in the area of insurance valuation are adequately identified and fully considered in accordance with this guidance, and the maps and supporting information has been approved by the Department’s Regional Engineer or other designated Department Dam Safety Staff, the dam owner, working with their insurance agent, shall acquire insurance in an amount that will substantially cover the costs of downstream property losses within the “range” and provide a certificate of insurance to the Department with a statement stipulating that “the insurance carried is believed to be sufficient to substantially cover the costs of downstream property losses to others resulting from a dam failure”.

**V. Adoption, Amendments, and Repeal:**

This document will remain in effect until rescinded or superseded.

  
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 Daphne W. Jamison  
 Board Chair

  
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 Clyde E. Cristman  
 Department Director

## Appendix 1

Applicable *Code of Virginia* Authorities.

The *Code of Virginia* contains the following authorities applicable to this Guidance:

### § 10.1-605. Promulgation of regulations by the Board; guidance document.

A. The Board shall adopt regulations to ensure that impounding structures in the Commonwealth are properly and safely constructed, maintained and operated. Dam safety regulations promulgated by the State Water Control Board shall remain in full force until amended in accordance with applicable procedures.

B. The Board's Impounding Structure Regulations shall not require any impounding structure in existence or under a construction permit prior to July 1, 2010, that is currently classified as high hazard, or is subsequently found to be high hazard through reclassification, to upgrade its spillway to pass a rainfall event greater than the maximum recorded within the Commonwealth, which shall be deemed to be 90 percent of the probable maximum precipitation.

1. Such an impounding structure shall be determined to be in compliance with the spillway requirements of the regulations provided that (i) the impounding structure will pass two-thirds of the reduced probable maximum precipitation requirement described in this subsection and (ii) the dam owner certifies annually and by January 15 that such impounding structure meets each of the following conditions:

a. The owner has a current emergency action plan that is approved by the Board and that is developed and updated in accordance with the regulations;

b. The owner has exercised the emergency action plan in accordance with the regulations and conducts a table-top exercise at least once every two years;

c. The Department has verification that both the local organization for emergency management and the Virginia Department of Emergency Management have on file current emergency action plans and updates for the impounding structure;

d. That conditions at the impounding structure are monitored on a daily basis and as dictated by the emergency action plan;

e. The impounding structure is inspected at least annually by a professional engineer and all observed deficiencies are addressed within 120 days of such inspection;

f. The owner has a dam break inundation zone map developed in accordance with the regulations that is acceptable to the Department;

g. The owner is insured in an amount that will substantially cover the costs of downstream property losses to others that may result from a dam failure; and

h. The owner shall post the dam's emergency action plan on his website, or upon the request of the owner, the Department or another state agency responsible for providing emergency management services to citizens agrees to post the plan on its website. If the Department or another state agency agrees to post the plan on its website, the owner shall provide the plan in a format suitable for posting.

2. A dam owner who meets the conditions of subdivisions 1 a through 1 h, but has not provided record drawings to the Department for his impounding structure, shall submit a complete record report developed in accordance with the construction permit requirements of the Impounding Structure Regulations, excluding the required submittal of the record drawings.

3. A dam owner who fails to submit certifications required by subdivisions 1 a through 1 h in a timely fashion shall not enjoy the presumption that such impounding structure is deemed to be

in compliance with the spillway requirements of the Board's Impounding Structure Regulations (4VAC50-20).

4. Any dam owner who has submitted the certifications required by subdivisions 1 a through 1 h shall make (i) such certifications, (ii) the emergency action plan required by subdivision 1 a, and (iii) the certificate of insurance required by subdivision 1 g available, upon request and within five business days, to any person. A dam owner may comply with the requirements of this subdivision by providing the same information on a website and directing the requestor to such website. A dam owner who fails to comply with this subdivision shall be subject to a civil penalty pursuant to § 10.1-613.2.

C. The Board's regulations shall establish an incremental damage analysis procedure that permits the spillway design flood requirement for an impounding structure to be reduced to the level at which dam failure shall not significantly increase downstream hazard to life or property, provided that the spillway design flood requirement shall not be reduced to below the 100-year flood event for high or significant hazard impounding structures, or to below the 50-year flood event for low hazard potential impounding structures.

D. The Board shall consider the impact of limited-use or private roadways with low traffic volume and low public safety risk that are downstream from or across an impounding structure in the determination of the hazard potential classification of an impounding structure.

#### **§ 10.1-606.2. Mapping of dam break inundation zones.**

A. An owner of an impounding structure shall prepare a map of the dam break inundation zone for the impounding structure in accordance with criteria set out in the Virginia Impounding Structure Regulations (4VAC 50-20). Existing maps prepared by the locality in accordance with these regulations may be used for this purpose.

B. All maps prepared in accordance with subsection A shall be filed with the Department of Conservation and Recreation and with the offices with plat and plan approval authority or zoning responsibilities as designated by the locality for each locality in which the dam break inundation zone resides.

C. Owners of impounding structures may be eligible for matching grants of up to 50 percent from the Dam Safety, Flood Prevention and Protection Assistance Fund and other sources of funding available to the Director to assist in the development of dam break inundation zone maps and for conducting incremental damage assessments in accordance with the Virginia Impounding Structure Regulations.

D. All properties identified within the dam break inundation zone shall be incorporated by the owner into the dam safety emergency action plan of that impounding structure so as to ensure the proper notification of persons downstream and other affected persons or property owners in the event of an emergency condition at the impounding structure.

## Appendix 2

### Applicable *Impounding Structure Regulations* Authorities.

The *Impounding Structure Regulations* contains the following authorities applicable to this Guidance.

#### **4VAC50-20-40. Hazard Potential Classifications of Impounding Structures.**

A. Impounding structures shall be classified in one of three hazard classifications as defined in subsection B of this section and Table 1.

B. For the purpose of this chapter, hazards pertain to potential loss of human life or damage to the property of others downstream from the impounding structure in event of failure or faulty operation of the impounding structure or appurtenant facilities. Hazard potential classifications of impounding structures are as follows:

1. High Hazard Potential is defined where an impounding structure failure will cause probable loss of life or serious economic damage. "Probable loss of life" means that impacts will occur that are likely to cause a loss of human life, including but not limited to impacts to residences, businesses, other occupied structures, or major roadways. Economic damage may occur to, but not be limited to, building(s), industrial or commercial facilities, public utilities, major roadways, railroads, personal property, and agricultural interests. "Major roadways" include, but are not limited to, interstates, primary highways, high-volume urban streets, or other high-volume roadways, except those having an AADT volume of 400 vehicles or less in accordance with 4VAC50-20-45.

2. Significant Hazard Potential is defined where an impounding structure failure may cause the loss of life or appreciable economic damage. "May cause loss of life" means that impacts will occur that could cause a loss of human life, including but not limited to impacts to facilities that are frequently utilized by humans other than residences, businesses, or other occupied structures, or to secondary roadways. Economic damage may occur to, but not be limited to, building(s), industrial or commercial facilities, public utilities, secondary roadways, railroads, personal property, and agricultural interests. "Secondary roadways" include, but are not limited to, secondary highways, low-volume urban streets, service roads, or other low-volume roadways, except those having an AADT volume of 400 vehicles or less in accordance with 4VAC50-20-45.

3. Low Hazard Potential is defined where an impounding structure failure would result in no expected loss of life and would cause no more than minimal economic damage. "No expected loss of life" means no loss of human life is anticipated.

C. To support the appropriate hazard potential classification, dam break analysis shall be conducted by the owner's engineer or the department in accordance with one of the following alternatives and utilizing procedures set out in 4VAC50-20-54.

1. The owner of an impounding structure that does not currently hold a regular or conditional certificate from the board, or the owner of an impounding structure that is already under certificate but the owner believes that a condition has changed downstream of the impounding structure that may reduce its hazard potential classification, may request in writing that the department conduct a simplified dam break inundation zone analysis to determine whether the impounding structure has a low hazard potential classification. The owner shall pay a fee to the department in accordance with 4VAC50-20-395 for conducting each requested analysis. The



department shall address requests in the order received and shall strive to complete analysis within 90 days; or

2. The owner may propose a hazard potential classification that shall be subject to approval by the board. To support the proposed hazard potential classification, an analysis shall be conducted by the owner's engineer and submitted to the department. The hazard potential classification shall be certified by the owner.

D. Findings of the analysis conducted pursuant to subsection C of this section shall result in one of the following actions:

1. For findings by the department resulting from analyses conducted in accordance with subdivision C 1 of this section:

a. If the department finds that the impounding structure appears to have a low hazard potential classification, the owner may be eligible for general permit coverage in accordance with 4VAC50-20-103.

b. If the department finds that the impounding structure appears to have a high or significant hazard potential classification, the owner's engineer shall provide further analysis in accordance with the procedures set out in 4VAC50-20-54 and this chapter. The owner may be eligible for grant assistance from the Dam Safety, Flood Prevention and Protection Assistance Fund in accordance with Article 1.2 (§ 10.1-603.16 et seq.) of Chapter 6 of Title 10.1 of the Code of Virginia.

2. For findings by the owner's engineer resulting from analyses conducted in accordance with subdivision C 2 of this section:

a. If the engineer finds that the impounding structure has a low hazard potential classification, the owner may be eligible for general permit coverage in accordance with 4VAC50-20-103; or

b. If the engineer finds that the impounding structure appears to have a high or significant hazard potential classification, then the owner shall comply with the applicable certification requirements set out in this chapter.

E. An incremental damage analysis in accordance with 4VAC50-20-52 may be utilized as part of a hazard potential classification by the owner's engineer.

F. Impounding structures shall be subject to reclassification by the board as necessary.

#### **4VAC50-20-50. Performance Standards Required for Impounding Structures.**

A. In accordance with the definitions provided by § 10.1-604 of the Code of Virginia and 4VAC50-20-30, an impounding structure shall be regulated if the impounding structure is 25 feet or greater in height and creates a maximum impounding capacity of 15 acre-feet or greater, or the impounding structure is six feet or greater in height and creates a maximum impounding capacity of 50 acre-feet or greater and is not otherwise exempt from regulation by the Code of Virginia. Impounding structures exempted from this chapter are those that are:

1. Licensed by the State Corporation Commission that are subject to a safety inspection program;

2. Owned or licensed by the United States government;

3. Operated primarily for agricultural purposes that are less than 25 feet in height or that create a maximum impoundment capacity smaller than 100 acre-feet;

4. Water or silt-retaining dams approved pursuant to § 45.1-222 or 45.1-225.1 of the Code of Virginia; or

5. Obstructions in a canal used to raise or lower water.

Impounding structures of regulated size and not exempted shall be constructed, operated and maintained such that they perform in accordance with their design and purpose throughout the life of the project. For impounding structures, the spillway capacity shall perform at a minimum to safely pass the appropriate spillway design flood as determined in Table 1. For the purposes of utilizing Table 1, Hazard Potential Classification shall be determined in accordance with 4VAC50-20-40.

TABLE 1 Impounding Structure Regulations			
Applicable to all impounding structures that are 25 feet or greater in height and that create a maximum impounding capacity of 15 acre-feet or greater, and to all impounding structures that are six feet or greater in height and that create a maximum impounding capacity of 50 acre-feet or greater and is not otherwise exempt from regulation by the Code of Virginia.			
Hazard Potential Class of Dam	Spillway Design Flood (SDF) <sup>B</sup> for New Construction <sup>F</sup>	Spillway Design Flood (SDF) <sup>B</sup> for Existing Impounding Structures <sup>F, G</sup>	Minimum Threshold for Incremental Damage Analysis
High	PMF <sup>C</sup>	0.9 PMP <sup>H</sup>	100-YR <sup>D</sup>
Significant	.50 PMF	.50 PMF	100-YR <sup>D</sup>
Low	100-YR <sup>D</sup>	100-YR <sup>D</sup>	50-YR <sup>E</sup>

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. Reductions in the established SDF may be evaluated through the use of incremental damage analysis pursuant to 4VAC50-20-52. The SDF established for an impounding structure shall not be less than those standards established elsewhere by state law or regulations, including but not limited to the Virginia Stormwater Management Program (VSMP) Regulation (9VAC25-870). Due to potential for future development in the dam break inundation zone that would necessitate higher spillway design flood standards or other considerations, owners may find it advisable to consider a higher spillway design flood standard than is required.

C. PMF: Probable Maximum Flood is 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 shall be calculated from the probable maximum precipitation (PMP) derived from the Probable Maximum Precipitation Study for Virginia (and associated PMP Evaluation Tool and Database) (November 2015). The owner's engineer must develop PMF hydrographs for 6-, 12-, and 24-hour durations. The hydrograph that creates the largest peak outflow is to be used to determine capacity for nonfailure and failure analysis. Present and planned land-use conditions shall be considered in determining the runoff characteristics of the drainage area.

D. 100-Yr: 100-year flood represents the flood magnitude expected to be equaled or exceeded on the average of once in 100 years. It may also be expressed as an exceedance probability with a 1.0% chance of being equaled or exceeded in any given year. Present and planned land-use conditions shall be considered in determining the runoff characteristics of the drainage area.

E. 50-Yr: 50-year flood represents the flood magnitude expected to be equaled or exceeded on the average of once in 50 years. It may also be expressed as an exceedance probability with a

2.0% chance of being equaled or exceeded in any given year. Present and planned land-use conditions shall be considered in determining the runoff characteristics of the drainage area.

F. For the purposes of Table 1 "Existing impounding structure" and "New construction" are defined in 4VAC50-20-30.

G. An existing impounding structure as defined in 4VAC50-20-30, that is currently classified as high hazard, or is subsequently found to be high hazard through reclassification, shall only be required to pass the flood resulting from 0.6 PMP instead of the flood resulting from the 0.9 PMP SDF if the dam owner meets the requirements set out in 4VAC50-20-53.

H. PMP: Probable maximum precipitation means the theoretically greatest depth of precipitation for a given duration that is meteorologically possible over a given size storm area at a particular geographical location at a particular time of year with no allowance made for future long-term climatic trends. In practice, this is derived by storm transposition and moisture adjustment to observed storm patterns. In Virginia, the 0.9 PMP is meant to characterize the maximum recorded rainfall event within the Commonwealth.

#### **4VAC50-20-52. Incremental Damage Analysis.**

A. The proposed potential hazard classification for an impounding structure may be lowered based on the results of an incremental damage analysis utilizing one of the following methodologies:

1. Section III of the United States Department of Interior, Bureau of Reclamation's ACER Technical Memorandum No. 11, 1988. An impact shall be deemed to occur where there are one or more lives in jeopardy as a result of a dam failure; or

2. An approach to determining hazard classification found in any document that is on the list of acceptable references set out in 4VAC50-20-320. The owner's engineer shall reference the methodology utilized in the submittal to the department.

B. The proposed spillway design flood for the impounding structure may be lowered based on the results of an incremental damage analysis. Once the owner's engineer has determined the required spillway design flood through application of Table 1, further analysis may be performed to evaluate the limiting flood condition for incremental damages. Site-specific conditions should be recognized and considered. In no situation shall the allowable reduced level be less than the level at which the incremental increase in water surface elevation downstream due to failure of an impounding structure is no longer considered to present an additional downstream threat. This engineering analysis will need to present water surface elevations at each structure that may be impacted downstream of the dam. An additional downstream threat to persons or property is presumed to exist when water depths exceed two feet or when the product of water depth (in feet) and flow velocity (in feet per second) is greater than seven.

The spillway design flood shall also not be reduced below the minimum threshold values as determined by Table 1.

C. The proposed potential hazard classification for the impounding structure and the required spillway design flood shall be subject to reclassification by the board as necessary to reflect the incremental damage assessment, changed conditions at the impounding structure, and changed conditions in the dam break inundation zone.

#### **4VAC50-20-53. Special Criteria for Reduced Sdf Requirement for Certain High Hazard Dams.**

A. An existing impounding structure that is currently classified as high hazard, or is subsequently found to be high hazard through reclassification, shall be allowed to pass the flood resulting from 0.6 PMP instead of the flood resulting from 0.9 PMP SDF if the dam owner certifies annually that such impounding structure meets each of the following conditions:

1. The owner has a current emergency action plan that is approved by the board and that is developed and updated in accordance with 4VAC50-20-175;
2. The owner has exercised the emergency action plan in accordance with 4VAC50-20-175 and conducts a table-top exercise at least once every two years;
3. The department has verification that both the local organization for emergency management and the Virginia Department of Emergency Management have on file current emergency action plans and updates for the impounding structure;
4. The conditions at the impounding structure are monitored on a daily basis and as dictated by the emergency action plan;
5. The impounding structure is inspected at least annually by a professional engineer and all observed deficiencies are addressed within 120 days of such inspection. Such inspection reports shall be completed in accordance with 4VAC50-20-105 E and be submitted to the department with the owner's certification;
6. The owner has a dam break inundation zone map developed in accordance with the regulations that is acceptable to the department;
7. The owner is insured in an amount that will substantially cover the costs of downstream property losses to others that may result from a dam failure; and
8. The owner has the impounding structure's emergency action plan posted on his website, or upon the request of the owner, the department or another state agency responsible for providing emergency management services to citizens agrees to post the plan on its website. If the department or another state agency agrees to post the plan on its website, the owner shall provide the plan in a format suitable for posting.

A dam owner who meets the conditions of subdivisions 1 through 8 of this subsection, but has not provided record drawings to the department for his impounding structure, shall submit a complete record report developed in accordance with 4VAC50-20-70 J, excluding the required submittal of the record drawings.

B. The dam owner must retain documents for a six-year period that supports the certification of the elements set out in subsection A.

#### **4VAC50-20-54. Dam Break Inundation Zone Mapping.**

A. Dam break inundation zone maps and analyses shall be provided to the department, except as provided for in 4VAC50-20-51, to meet the requirements set out in 4VAC50-20-40, 4VAC50-20-175, and 4VAC50-20-177, as applicable. In accordance with subsection G of this section, a simplified dam break inundation zone map and analysis may be completed by the department and shall be provided to the impounding structure's owner to assist such owner in complying with the requirements of this chapter. All analyses shall be completed in accordance with 4VAC50-20-20 D.

B. The location of the end of the inundation mapping should be indicated where the water surface elevation of the dam break inundation zone and the water surface elevation of the spillway design flood during an impounding structure nonfailure event converge to within one

foot of each other. The inundation maps shall be supplemented with water surface profiles showing the peak water surface elevation prior to failure and the peak water surface elevation after failure.

C. All inundation zone map(s) shall be signed and sealed by a licensed professional engineer.

D. Present and planned land-use for which a development plan has been officially approved by the locality in the dam break inundation zones downstream from the impounding structure shall be considered in determining the classification.

E. For determining the hazard potential classification, an analysis including, but not limited to, those hazards created by flood and nonflood dam failures shall be considered. At a minimum, the following shall be provided to the department:

1. A sunny day dam break analysis utilizing the volume retained at the normal or typical water surface elevation of the impounding structure;
2. A dam break analysis utilizing the spillway design flood with a dam failure;
3. An analysis utilizing the spillway design flood without a dam failure; and
4. A dam break analysis utilizing the probable maximum flood with a dam failure.

F. To meet the Emergency Action Plan requirements set out in 4VAC50-20-175 and the Emergency Preparedness Plan requirements set out in 4VAC50-20-177, all owners of impounding structures shall provide dam break inundation zone map(s) representing the impacts that would occur with both a sunny day dam failure and a probable maximum flood with a dam failure.

1. The map(s) shall be developed at a scale sufficient to graphically display downstream inhabited areas and structures, roads, public utilities that may be affected, and other pertinent structures within the identified inundation area. In coordination with the local organization for emergency management, a list of downstream inundation zone property owners and occupants, including telephone numbers may be plotted on the map or may be provided with the map for reference during an emergency.

2. Each map shall include the following statement: "The information contained in this map is prepared for use in notification of downstream property owners by emergency management personnel."

Should the department prepare a dam break inundation zone map and analysis in response to a request received pursuant to 4VAC50-20-40 C, the owner shall utilize this map to prepare a plan in accordance with this subsection.

G. Upon receipt of a written request in accordance with 4VAC50-20-40 C and receipt of a payment in accordance with 4VAC50-20-395, the department shall conduct a simplified dam break inundation zone analysis. In conducting the analysis, a model acceptable to the department shall be utilized. The analysis shall result in maps produced as Geographic Information System shape files for viewing and analyzing and shall meet the other analysis criteria of this section.

Upon completion of the analysis, the department shall issue a letter to the owner communicating the results of the analysis including the dam break inundation zone map, stipulating the department's finding regarding hazard potential classification based on the information available to the department, and explaining what the owner needs to do procedurally with this information to be compliant with the requirements of the Dam Safety Act (§ 10.1-604 et seq.) and this chapter.