Virginia Regulatory Town Hall

townhall.virginia.gov

# Proposed Regulation
# Agency Background Document

| | |
|---|---|
| **Agency name** | Virginia Soil and Water Conservation Board |
| **Virginia Administrative Code (VAC) citation** | 4 VAC 50-20 |
| **Regulation title** | Impounding Structure Regulations |
| **Action title** | Amend, modify, or delete provisions of Virginia's Impounding Structure Regulations to enhance the Dam Safety Program and to improve public safety. |
| **Date this document prepared** | March 20, 2007 (amended August 1, 2007) |

This information is required for executive branch review and the Virginia Registrar of Regulations, pursuant to the Virginia Administrative Process Act (APA), Executive Orders 36 (2006) and 58 (1999), and the *Virginia Register Form, Style, and Procedure Manual.*

## Brief summary

*In a short paragraph, please summarize all substantive changes that are being proposed in this regulatory action.*

This regulatory action amends the Virginia Soil and Water Conservation Board's Impounding Structure Regulations and is being advanced to protect the safety and welfare of the public and their property from the impact of dam failures. The key elements of this proposed regulation will:

1) Revise the dam hazard potential classification system [Change the dam classification system from four categories (Class I, II, III, and IV) to three hazard classifications (High, Significant, and Low)];
2) Specify that spillway design requirements are applicable to all state regulated dams [Table 1 of the regulations will now apply to all dams regardless of the date they were built];
3) Modify the spillway design requirements to enhance public safety and reduce subjectivity;

4) Allow for the potential reduction of the spillway design flood requirements through incremental damage assessments for all qualifying dams;
5) Establish dam break inundation zone mapping requirements in order to identify areas that will be subject to flooding during a dam failure;
6) Expand emergency action plan requirements for High and Significant Hazard Potential dams and emergency preparedness plan requirements for Low Hazard Potential dams in order to enhance public safety and public awareness;
7) Establish permit application fees for the administration of the Dam Safety Program;
8) Remove the forms that are incorporated by reference and move reporting standards into the regulations;
9) Create new definitions or modify current definitions;
10) Reorganize, clarify, and expand sections related to permitting procedures; and
11) Update sections related to inspections, enforcement, and unsafe conditions.

NOTE: The following is a listing of acronyms frequently used within this document:

- DCR – Virginia Department of Conservation and Recreation
- EAP – Emergency Action Plan
- SDF – Spillway Design Flood
- PMF – Probable Maximum Flood
- TAC – Technical Advisory Committee
- ASDSO – Association of State Dam Safety Officials
- NGF – Non-General Fund
- GF – General Fund
- SWCD – Soil and Water Conservation District
- NOIRA – Notice of Intended Regulatory Action
- FEMA – Federal Emergency Management Agency
- FERC – Federal Energy Regulatory Commission
- Additionally, the terms “dam” and “impounding structure” may be used interchangeably.

## Legal basis

*Please identify the state and/or federal legal authority to promulgate this proposed regulation, including (1) the most relevant law and/or regulation, including Code of Virginia citation and General Assembly chapter number(s), if applicable, and (2) promulgating entity, i.e., the agency, board, or person. Describe the legal authority and the extent to which the authority is mandatory or discretionary.*

The Virginia Dam Safety Act (§10.1-604 through §10.1-613 of the Code of Virginia) ensures public safety through the proper and safe design, construction, operation, and maintenance of impounding structures in the Commonwealth. This is accomplished through the effective administration of the Virginia Dam Safety Program (Program). Authority for the Program rests with the Virginia Soil and Water Conservation Board (Board) and it is administered on behalf of the Board by the Department of Conservation and Recreation’s Division of Dam Safety and Floodplain Management. The Program focuses on enhancing public safety through bringing all impounding structures of regulated size under Regular Operation and Maintenance Certificates.

Pursuant to §10.1-605, the Board is directed to promulgate regulations for impounding structures:

> *§10.1-605 The Board shall promulgate regulations to ensure that impounding structures in the Commonwealth are properly and safely constructed, maintained and operated.*

Further, the Board reserves the sole right to promulgate regulations:

> *§10.1-605.1. Delegation of powers and duties. - The Board may delegate to the Director or his designee any of the powers and duties vested in the Board by this article, except the adoption and promulgation of regulations or the issuance of certificates. Delegation shall not remove from the Board authority to enforce the provisions of this article.*

These regulations, entitled the Impounding Structure Regulations (4 VAC 50-20-10 et seq.), were first promulgated by the Virginia Soil and Water Conservation Board's predecessor 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 with an effective date of February 1, 1989 (4 VAC 50-20-10. Authority).

In 2001 (with an effective date of July 1, 2002), Chapter 92 [SB1166] of the Virginia Acts of Assembly dramatically increased the number of dams that fall under state regulation by broadening the definition of an impounding structure. As amended, the definition includes the following:

> *§ 10.1-604 "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 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 [constructed, maintained or*[*]*] 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.*
>
> * The bracketed language was removed during the 2006 legislative Session [Chapter 30 (HB597) of the 2006 Virginia Acts of Assembly].

Authorities within the regulations were expanded by the Board in July 1, 2002 (Virginia Register Volume 18, Issue 14) in reaction to this legislative action.

The Virginia Soil and Water Conservation Board authorized and directed the filing of this proposed regulation at its November 15, 2006 meeting.

## Purpose

*Please explain the need for the new or amended regulation by (1) detailing the specific reasons why this regulatory action is essential to protect the health, safety, or welfare of citizens, and (2) discussing the goals of the proposal, the environmental benefits, and the problems the proposal is intended to solve.*

As there have been no regulatory changes made to the impounding structure regulations since the late 1980's except to update the definition of regulated dams to conform it with the 2001 legislative change in definition [Chapter 92 (SB1166) of the 2001 Virginia Acts of Assembly], it was determined that this body of regulations required a substantive review and potential revisions. Since the 1980's, public safety concerns have evolved and engineering and technology and methodologies have advanced. These events have resulted in the need to consider amendments to the regulations. Further with the significant revisions made to the Virginia Dam Safety Act during the 2006 legislative session [Chapter 30 (HB597) of the 2006 Virginia Acts of Assembly] it is necessary to update the regulations to reflect those revised and enhanced powers and authorities. It has also been determined that the administration and implementation of the Dam Safety Program could be improved through regulatory updates and that the intent and procedures embodied within the regulations could be clarified for the regulated community's and the public's benefit.

For the purposes outlined above and most importantly for the purpose of protecting the safety and welfare of the public and their property from the impacts of a dam failure, this regulatory action amends the Virginia Soil and Water Conservation Board's Impounding Structure Regulations to:

1) Revise the dam hazard potential classification system;
2) Specify that spillway design requirements are applicable to all state regulated dams;
3) Modify the spillway design requirements to enhance public safety and reduce subjectivity;
4) Allow for the potential reduction of the spillway design flood requirement through an incremental damage assessment for all qualified dams;
5) Establish dam break inundation zone mapping requirements;
6) Expand emergency action plan requirements for High and Significant Hazard Potential dams and emergency preparedness plan requirements for Low Hazard Potential dams;
7) Establish permit application fees for the administration of the Dam Safety Program that will create a stream of revenue sufficient to support an additional dam safety engineer;
8) Remove the forms that are incorporated by reference and move reporting standards into the regulations
9) Create new definitions or modify current definitions;
10) Reorganize, clarify, and expand sections related to permitting procedures; and
11) Update sections related to inspections, enforcement, and unsafe conditions.

Making these key modifications to the regulations will result in a Dam Safety Program that will be better able to protect the public's safety, treat all dam owners similarly and fairly in accordance with the regulations, increase awareness of dams and their potential impacts within local governments and their citizens, and help improve the administration of the program to the

benefit of the public. The implementation of the criteria established in this regulation should minimize dam failure and the potential significant impacts associated with such a failure.

It should also be noted that many of these impounding structures also have environmental benefits in that they serve as sediment retention basins thus improving water quality. However, alternatively, the failure of such an impounding structure may result in significant downstream environmental damages should the sediment be released.

## Substance

*Please briefly identify and explain the new substantive provisions, the substantive changes to existing sections, or both where appropriate. (More detail about these changes is requested in the "Detail of changes" section.)*

Key provisions of this regulatory action include the following:

1) A revision of the dam classification system from four categories (Class I, II, III, and IV) to three hazard classifications (High, Significant, and Low). **[4VAC50-20-40]**

This will conform the classification categories to those used by federal agencies and many states. Functionally, the change will primarily involve grouping Class III and Class IV dams together into the Low category. Currently the Class IV dams do not have to have an engineer, an inspection, or an Emergency Action Plan (EAP). It was determined that all dams should be regulated similarly for dam safety purposes.

2) A specification that the Spillway Design Flood requirements (Table 1) are applicable to all dams not just "new" (post July 1982) dams. In addition, Table 1 is revised to:

- Reflect the revised dam classifications.
- Update spillway design requirements to enhance public safety and to move towards federal standards.
- Eliminate spillway design flood ranges which may result in inconsistency in application.
- Require that the spillway of all High hazard dams be engineered to pass the full Probable Maximum Flood.
- Specify minimum thresholds for incremental damage assessment. **[4VAC50-20-50]**

  It was determined that for the purposes of public safety that all dams should be regulated in accordance with standardized spillway design requirements and evaluation procedures.

3) The creation of a new section that allows for the potential reduction of the spillway design flood requirement through an incremental damage assessment for those dams meeting the specified administrative requirements. This would now be applicable to all eligible dams where previously it was only available to dams constructed prior to July 1982. Additionally, it is specified that the spillway design flood shall not be reduced below the minimum threshold values as determined by Table 1. **[4VAC50-20-52]**

In consultation with the technical advisory committee, it was determined that the incremental damage assessment should be made available to all dam owners to see if a

reduction in the required Spillway Design flood (SDF) could be considered where the breach of a dam would not significantly worsen downstream flooding. It was determined that a minimum threshold be established below which the SDF could not be reduced to set out a baseline that adequately protects public safety.

4) The creation of a new section that sets out dam break inundation zone mapping requirements. **[4VAC50-20-54]**

In consultation with the TAC, it was determined that both for hazard potential classification determination for all dams and for Emergency Action Plans for High and Significant dams that a dam break inundation zone map should be required. The map will specify the areas that might be inundated during both a sunny day failure and a probable maximum flood (PMF) failure in order to demonstrate the levels where failure of the dam does not further constitute a hazard to downstream life or property. The areas to be impacted during a break should be the areas of focus for emergency warnings and evacuations.

5) A specification that for each Operation and Maintenance certificate (Regular or Conditional) issued, the impounding structure owner shall send a copy of the certificate to the appropriate local government(s) with planning and zoning responsibilities. **[4VAC50-20-58]**

As downstream development approved by a locality may result in the change in hazard potential classification of an upstream dam and for the need for the dam to upgrade its spillway design at a significant expense to the owner, this notification may result in localities making more informed zoning decisions regarding a development.

6) The development of language establishing a delayed effective date for certain dams determined to have an adequate spillway capacity prior to the effective date of these regulations but that would require modifications due to changes in the regulations.

- It is specified that the owner shall submit to the Board an Alteration Permit Application and associated documents to address spillway capacity prior to the expiration of this Regular Operation and Maintenance Certificate or within 3 years of the effective date of these regulations, whichever is later. As regular certificates are good for 6 years from time of issuance, this would mean that complete applications would be due no sooner than 3 years and no later than 6 years.
- It is specified that the Alteration Permit Application shall contain a construction sequence with milestones for completing the necessary improvements within 5 years of Alteration Permit issuance. (NOTE: 8 to 11 years in total to come into compliance) **[4VAC50-20-125]**

In light of the costs associated with upgrading a dam to meet the new spillway design safety requirements and the time necessary to conduct the associated engineering studies and alteration activities, it was determined that a phased in effective date should be included in the regulations for dams that currently meet regulatory standards.

8) The creation of a new section expanding emergency action plan requirements for High and Significant Hazard Potential dams. **[4VAC50-20-175]**

A fundamental element of protecting against the loss of life that may occur upon the failure of an impounding structure is the development of an emergency action plan that may be successfully implemented. The plan would be developed and periodically tested

in coordination with all entities, jurisdictions, and agencies that would be affected by a dam failure or that have statutory responsibilities for warning, evacuation, and post-flood actions.

9) The creation of a new section establishing emergency preparedness plan requirements for each Low Hazard Potential dam. **[4VAC50-20-177]**

As low hazard dams do not pose the same risk to loss of life as higher hazard dams, it was determined that an abbreviated emergency preparedness plan should be required. Such a plan would allow for contacts to downstream landowners that may sustain a loss of personal property should a dam fail (ex. farmer losing livestock or machinery).

10) The creation of a series of new sections that cites the authority for the Board to establish and collect application fees for the administration of the dam safety program, administrative review, certifications, and the repair and maintenance of dams and that establishes such fees.

- **4VAC 50-20-340** Authority to establish fees
- **4VAC 50-20-350** Fee Submittal Procedures
- **4VAC 50-20-360** Fee Exemptions
- **4VAC 50-20-370** Construction Permit Application Fees
- **4VAC 50-20-380** Regular Operation and Maintenance Certificate Application Fees
- **4VAC 50-20-390** Conditional Operation and Maintenance Certificate Application Fee
- **4VAC 50-20-400** Incremental Damage Analysis Review Fee

It is understood that the Commonwealth needs sufficient staff and fiscal resources to properly administer a regulatory program. A publication by the Association of State Dam Safety Officials (Model State Dam Safety Program, Association of State Dam Safety Officials, 1998) states 10 state regulators are needed for every 250 dams. The Department currently regulates almost 600 dams and has in its inventory over 1,700 dams, a significant number of which should be regulated, with only four Regional Engineer positions and one Program Manager. The staff workload is much higher than in other states. The fees, which have been purposely set low to reduce constituent impacts, would generate sufficient revenue to fund approximately one engineer on an annual basis.

11) The removal of all forms currently incorporated by reference and incorporation of required elements of the forms into the regulations. Recommended forms will still be available.

This will allow for the modification and improvement of forms without going through a lengthy regulatory action. The Department will still utilize a public process to make substantial changes to the forms.

12) The provision of definitions or modifications to definitions for “Agricultural purpose”, “Alteration”, “Construction”, “Dam break inundation zone”, “Department”, “Drill”, “Emergency Action Plan or EAP”, “Emergency Action Plan Exercise”, “Emergency Preparedness Plan”, “Freeboard”, “Height”, “Spillway”, “Stage I condition”, “Stage II condition”, Stage III condition”, “Sunny Day Dam Failure”, and “Tabletop Exercise”. **[4VAC50-20-30]**

In order to support the above referenced amendments, the addition or alteration of definitions was necessary.

13) Reorganizes, clarifies, and expands multiple sections related to permits and repeals sections that are incorporated into the reorganized sections.

- **4VAC50-20-70** Construction permits.
- **4VAC50-20-80** Alterations permits.
- **4VAC50-20-90** Transfer of permits.
- **4VAC50-20-105** Regular Operation and Maintenance Certificates.
- **4VAC50-20-150** Conditional Operation and Maintenance Certificate.
- **4VAC50-20-155** Extension of Operation and Maintenance Certificates.
- **4VAC50-20-160** Additional operation and maintenance requirements.

In an effort to provide additional clarity to the permitting process, a number of sections related to permitting were reorganized. It is hoped that these revised sections will provide better guidance to the regulated community as they pursue the necessary permits and seek additional information regarding the permitting processes.

14) The creation of a new section stating that dams 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 are exempt from the regulations. **[4VAC50-20-165]**

This is to clarify the exemption contained in 4VAC50-20-30 and 4VAC50-20-50 and to set out exemption validation procedures and reporting form components.

15) Updates sections related to inspections **[4VAC50-20-180]**, enforcement **[4VAC50-20-200**], and unsafe conditions **[4VAC50-20-220]** to reflect changes in the Code pursuant to Chapter 30 (HB597) of the 2006 Virginia Acts of Assembly.

These changes will conform the regulations to 2006 changes in the Virginia Dam Safety Act.

## Issues

*Please identify the issues associated with the proposed regulatory action, including:*
*1) the primary advantages and disadvantages to the public, such as individual private citizens or businesses, of implementing the new or amended provisions;*
*2) the primary advantages and disadvantages to the agency or the Commonwealth; and*
*3) other pertinent matters of interest to the regulated community, government officials, and the public.*

*If the regulatory action poses no disadvantages to the public or the Commonwealth, please so indicate.*

---

The primary advantage of the proposed regulations is the enhancement of public safety. The proposed regulations help promote the safe design, construction, alteration, maintenance, and operation of impounding structures in the Commonwealth of Virginia, and thus benefit private citizens, businesses, local governments, and the Commonwealth as a whole. The proposed regulations also track federal standards closer in an effort to improve public safety. The Ad Hoc Dam Safety Study Committee, which was formed at the request of the Virginia Soil and Water Conservation Board, observed in its April 30, 2005 report that "[m]any of the nation's dams, some originally built in the 1950s and 1960s, are in need of significant maintenance and/or redesign and upgrading. As a result of their age and unusually heavy rain events, a number of dams have failed and resulted in significant downstream damage, death or injury." Maintaining

the regulations as they currently are will significantly hamper the efforts of the Board to strengthen the Dam Safety Program and to promote the safety of impounding structures in the Commonwealth.

In addition, the proposed regulations provide some environmental benefit. Impounding structures often are constructed as retention devices for silt and other materials; ensuring their safe operation and maintenance prevents these pollutants from being released into downstream water bodies and environments.

Failure of dams or living downstream of dams that are in need of upgrades may also impact property and insurance values. Implementation of these regulations will reduce such dam failures.

Finally, the current action is intended to increase user-friendliness of many aspects of the Dam Safety Program. Vague and confusing references within the regulations have been clarified or removed where possible, and outdated required forms have been removed from the regulations to permit more frequent updates in order to enhance clarity and usefulness. In addition, confusing and conflicting provisions have been amended to allow for clarity and ease of understanding.

The primary disadvantages of the proposed regulations to private citizens, local governments, and agencies of the Commonwealth are upgrading and repair costs, as all of these entity types may own impounding structures in need of rehabilitation or upgrading based on the criteria set forth by the proposed regulations. The estimated costs of implementing dam upgrades to conform with SDF requirements in the proposed regulations is approximately $249 million. While substantial, these costs are necessary to ensure that impounding structures are constructed, operated, and maintained in a way that adequately protects the safety of downstream homes, businesses, communities, and associated infrastructure. Other items that may be considered disadvantages by the dam owners are the costs associated with dam break inundation zone mapping, application fees, and EAP preparation.

## Requirements more restrictive than federal

*Please identify and describe any requirement of the proposal which are more restrictive than applicable federal requirements. Include a rationale for the need for the more restrictive requirements. If there are no applicable federal requirements or no requirements that exceed applicable federal requirements, include a statement to that effect.*

---

There are no applicable federal requirements; impounding structures that are owned or licensed by the federal government are exempt from the Dam Safety Act and its regulations pursuant to § 10.1-604 of the Code of Virginia. The proposed regulations do track many standards applicable to impounding structures owned and/or licensed by the federal government in order to achieve improved public safety, uniformity of application, and consistency with approaches likewise adopted by other states.

## Localities particularly affected

*Please identify any locality particularly affected by the proposed regulation. Locality particularly affected means any locality which bears any identified disproportionate material impact which would not be experienced by other localities.*

There are 58 Virginia localities which own or maintain state-regulated impounding structures (114 dams). These localities may incur additional costs associated with the operation and maintenance of their impounding structures as a result of this proposed regulation, including costs associated with inundation mapping, emergency action plan development, engineering assessments, structural improvements, and application submittal; however, no locality will bear a disproportionate cost per impounding structure.

| Locality | Number of state regulated impounding structures owned or maintained |
|---|---|
| Albemarle County | 6 |
| Amherst County | 4 |
| Augusta County | 2 |
| Brunswick County | 1 |
| Buckingham County | 1 |
| Campbell County | 1 |
| Carroll County | 1 |
| Chesterfield County | 2 |
| Fairfax County | 8 |
| Fauquier County | 1 |
| Frederick County | 1 |
| Gloucester County | 1 |
| Henrico County | 1 |
| Henry County | 1 |
| James City County | 3 |
| Louisa County | 1 |
| Patrick County | 7 |
| Prince Edward County | 1 |
| Prince William County | 2 |
| Roanoke County | 1 |
| Spotsylvania County | 1 |
| Stafford County | 5 |
| Tazewell County | 1 |
| City of Bedford | 1 |
| City of Clifton Forge | 1 |
| City of Fairfax | 3 |
| City of Fredericksburg | 2 |
| City of Harrisonburg | 1 |
| City of Lexington | 2 |
| City of Lynchburg | 3 |
| City of Manassas | 2 |
| City of Martinsville | 2 |
| City of Newport News | 6 |
| City of Norfolk | 3 |
| City of Norton | 2 |
| City of Portsmouth | 4 |

| | |
|---|---|
| City of Staunton | 2 |
| City of Virginia Beach | 1 |
| City of Waynesboro | 1 |
| City of Williamsburg | 1 |
| Town of Appalachia | 1 |
| Town of Big Stone Gap | 2 |
| Town of Brookneal | 1 |
| Town of Chatham | 2 |
| Town of Coeburn | 1 |
| Town of Culpeper | 2 |
| Town of Drakes Branch | 1 |
| Town of Keysville | 1 |
| Town of Luray | 2 |
| Town of Pulaski | 2 |
| Town of Purcellville | 1 |
| Town of Scottsville | 1 |
| Town of South Boston | 1 |
| Town of Strasburg | 1 |
| Town of Tazewell | 1 |
| Town of Warrenton | 2 |
| Town of Wise | 1 |
| Town of Woodstock | 1 |
| **Total** | **114** |

Additionally, there are 10 service authorities (including water authorities, sewage authorities, park authorities and airport authorities) which own or maintain state-regulated impounding structures and that may serve multiple localities (20 dams). These authorities may incur additional costs associated with the operation and maintenance of their impounding structures as a result of this proposed regulation, including costs associated with inundation mapping, emergency action plan development, engineering assessments, structural improvements, and application submittal; however, no service authority will bear a disproportionate cost per impounding structure.

| Service Authority | Number of state regulated impounding structures owned or maintained |
|---|---|
| Appomattox River Water Authority | 1 |
| Augusta County Service Authority | 1 |
| Fairfax County Park Authority | 2 |
| Louisa County Water Authority | 1 |
| Metro-Washington Airport Authority | 2 |
| Nelson County Service Authority | 1 |
| Rapidan Service Authority | 1 |
| Rivanna Water and Sewer Authority | 6 |
| Upper Occoquan Sewage Authority | 1 |
| Western Virginia Water Authority | 4 |
| **Total** | **20** |

Additionally, 12 of the local Soil and Water Conservation Districts own or maintain state-regulated impounding structures (104 dams). These Soil and Water Conservation Districts may incur additional costs associated with the operation and maintenance of their impounding structures as a result of this proposed regulation, including costs associated with inundation mapping, emergency action plan development, engineering assessments, structural

improvements, and application submittal; however, no Soil and Water Conservation District will bear a disproportionate cost per impounding structure.

| Soil and Water Conservation District | Number of state regulated impounding structures owned or maintained |
|---|---|
| Blue Ridge | 10 |
| Culpeper | 11 |
| Hanover-Caroline | 1 |
| Headwaters | 11 |
| Lord Fairfax | 2 |
| Mountain Castles | 4 |
| Peter Francisco | 17 |
| Piedmont | 14 |
| Robert E. Lee | 6 |
| Shenandoah Valley | 8 |
| Southside | 12 |
| Thomas Jefferson | 8 |
| **Total** | **104** |

## Public participation

*Please include a statement that in addition to any other comments on the proposal, the agency is seeking comments on the costs and benefits of the proposal and the impacts of the regulated community.*

Public participation in the development of these regulations is very important to the Board. These proposed regulations represent the work of a 28-member technical advisory committee between May and October of 2006. Seven full meetings of the TAC were held and three subcommittee meetings during this period. Additionally, in an effort to keep the public involved in the development of the proposed regulations, the Department posted to its website all of the materials associated with each TAC or subcommittee meeting in order for the public to remain informed of the discussions of the TAC and the development of the proposed regulatory language (http://www.dcr.virginia.gov/lawregs.shtml).

As this regulatory action moves forward, in addition to any other comments concerning the proposed regulations that individuals wish to offer during the public comment period, the Board is also seeking comments on the costs, benefits and potential impacts of this regulatory proposal. Also, the Board is seeking information on impacts on small businesses as defined in § 2.2-4007.1 of the Code of Virginia. Information may include 1) projected reporting, recordkeeping and other administrative costs, 2) probable effect of the regulation on affected small businesses, and 3) description of less intrusive or costly alternative methods of achieving the purpose of the regulation.

Persons desiring to submit written comments pertaining to this proposed regulation may do so during the public comment period by the Internet, mail, or facsimile. It is preferred for comments to be posted to the "Open for Comment" page of the Virginia Regulatory Town Hall website in the "Secretariat of Natural Resources" portion of the page under the Virginia Soil and Water Conservation Board's impounding structures regulatory action. Comments pertaining to this proposed regulation may also be mailed to the Regulatory Coordinator at: Virginia

Department of Conservation and Recreation, 203 Governor Street, Suite 302, Richmond, Virginia 23219. Comments may also be faxed to the Regulatory Coordinator at: 804.786.6141. All written comments must include the name and address of the commenter (email addresses would also be appreciated). In order to be considered, comments must be received by 5:00 p.m. on the date established as the close of the comment period.

The Department, as authorized by the Board, will hold at least one public hearing to provide opportunity for public comment. Notice of the hearing(s) will be posted on the Virginia Regulatory Town Hall website (www.townhall.virginia.gov) and can be found in the Calendar of Events section of the Virginia Register of Regulations. Both oral and written comments may be submitted at that time.

## Economic impact

*Please identify the anticipated economic impact of the proposed regulation.*

**Significant Qualifiers**

Any cost estimates arrived at in this section need to be qualified.

- The magnitude of use of the incremental damage assessment is unknown,
- The costs associated with the currently compliant dams could be spread over as many as 11 years,
- The costs associated with dam repairs are expected to continue to rise in the future,
- The Department is currently working with the Virginia Resources Authority to develop a funding assistance program to provide qualified dam owners with low interest loans for dam repairs,
- Many of the dams currently identified as size-exempt may be found to be of regulated size upon inspection and may add to the future cost of these regulations, and
- No price tag can be placed on the lives that could be lost in the future due to dam failure.

Details on these qualifiers will be provided throughout this section.

**The Economics and Likelihood of Dam Failure from a National Perspective [excerpts from the Association of State Dam Safety Officials (ASDSO) website]**

Safety is key to the effectiveness of a dam. Dam failures can be devastating for the dam owners, to the dam's intended purpose and, especially, for downstream populations and property. Property damage can range in the thousands to billions of dollars. No price can be put on the lives that have been lost and could be lost in the future due to dam failure. Failures know no state boundaries—inundation from a dam failure could affect several states and large populations.

Although the majority of dams in the U.S. have responsible owners and are properly maintained, still many dams fail every year. Historically, some of the largest disasters in the United States have resulted from dam failures. In the past several years, there have been hundreds of

documented failures across the nation (this includes 250 failures after the Georgia Flood of 1994). A life was recently lost in New Hampshire as a result of a dam failure. Dam and downstream repair costs resulting from failures in 23 states in one recent year totaled $54.3 million. In 1889, 2,209 lives were lost when the South Fork Dam failed above Johnstown, Pennsylvania. The 1928 St. Francis Dam failure killed 450. The Laurel Run Dam failure in 1977 killed 40 in Pennsylvania. During the 1970s, the failures of the Buffalo Creek Dam in West Virginia, Teton Dam in Idaho and the Toccoa Falls Dam in Georgia collectively cost 175 lives and more than $1 billion in losses. The May 2003 failure of Silver Lake Dam, Michigan, caused over $100 million in damages. Mississippi was home to 2004's worst dam failure damaging or destroying 101 homes, two churches, three businesses, and a fire station near the Big Bay Lake Dam.

Dams age like any man-made structure. With age comes potential deterioration. Additionally, technical standards are improved and downstream areas become more heavily populated over time. All this affects the need to upgrade dams. Many dams have been designed for an effective life of 50 years. The majority of dams in this country are quickly approaching this age, and rehabilitation of these structures is a major concern. In fact, it has been estimated, based on dam inventory data, that, by the year 2000, 30 percent of dams will be 50 years old. In the year 2020, 80 percent of dams will reach the half-century mark.

In 2002, a Task Committee of the Association of State Dam Safety Officials estimated that $36.2 billion is needed to rehabilitate non-federal dams ($724 million per state on average) and that $10.1 billion is needed over the next 12 years for repairs to "the nations most critical dams." Responsibility to undertake this rehabilitation generally falls to dam owners. [The Cost of Rehabilitating our Nation's Dams: A Methodology, Estimate, and Proposed Funding Mechanisms; Prepared by a Task Committee of the Association of State Dam Safety Officials; December 2002, Revised October 2003]

To make the situation worse, emergency preparedness is lacking. Only 33 percent of non-federally owned dams considered high hazard in the U.S. have emergency action plans. That means that most dam owners and local authorities are not prepared for a sudden dam failure and the ensuing downstream consequences.

As is evidenced by the Table outlined below, there have been over 2707 incidents and 559 dam failures logged into the National Performance of Dams Program database between 1990 and 2007.

| **National Performance of Dams Incident Database** | | |
|---|---|---|
| **Year** | **Total No. of Dam Incident Notifications** | **No. of Dam Failures** |
| 1990 | 38 | 13 |
| 1991 | 24 | 6 |
| 1992 | 28 | 3 |
| 1993 | 58 | 20 |
| 1994 | 434 | 250 |
| 1995 | 215 | 28 |
| 1996 | 244 | 26 |

| | | |
|---|---|---|
| 1997 | 181 | 34 |
| 1998 | 283 | 37 |
| 1999 | 394 | 58 |
| 2000 | 304 | 18 |
| 2001 | 164 | 7 |
| 2002 | 154 | 11 |
| 2003 | 31 | 8 |
| 2004 | 44 | 23 |
| 2005 | 22 | 6 |
| 2006 | 89 | 11 |
| **Total** | **2707** | **559** |

Upgrades to dam spillways are critical to prevent dam failures during storm events. Since severe storms have been measured in the United States, Virginia or areas contiguous to Virginia have been the site of nine (9) of the 19 most severe rainfall events. Virginia itself has been the site of two of the five most intense 12-hour storms in the Country. (For example, in 1955, 24 inches of rain fell on Page County in 24 hours. During Camille in 1969, Nelson County was deluged by 27 inches in nine hours. More recently in 2003, Augusta County saw 22 inches in 24 hours and the Richmond metropolitan area received 10 to 14 inches in less than eight hours during tropical storm Gaston in 2004.)

In order to prevent loss of life and property from the potential failure of Virginia's dams, the Virginia Dam Safety Program has been working diligently to improve the state's dam safety standards in both its laws and regulations. Although the modifications set out in these regulations will result in increased costs to the regulated community, the offsetting costs of dam failures that may be averted are immeasurable.

Although the spillway design floods proposed in Table 1 of the regulations are less stringent then those established by FERC (High and Significant = PMF; Low = 100 year), the proposed regulations are believed to strike a reasonable balance between striving for public safety and yet recognizing the significant costs associated with requiring spillway upgrades.

**Virginia Dam Inventory Overview**

For the purposes of responding to the questions in this section, the Department completed an analysis of its November 2006 dam safety inventory database. The inventory contains information on 1,731 dams. Of these dams, ownership is as follows:

| Owner | State | SWCD | Local Government | Private | Federal | Unknown Ownership | Total |
|---|---|---|---|---|---|---|---|
| Total | 80 | 104 | 193 | 1278 | 67 | 9 | 1,731 |

A further breakdown of the 1,731 dams by their status within the Dam Safety Program is as follows:

| Dam Status | Regular Certificate | Conditional Certificate | Current Class 4 | Enforcement Actions | Expected Regulation | Under Construction |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| **Total** | 400 | 128 | 30 | 8 | 39 | 15 |

| Dam Status | Federal/Mining Regulation | Agricultural Exemption | Size Exemption | Breached/ Failed | Designed, Not Built | Unknown Status |
|---|---|---|---|---|---|---|
| **Total** | 135 | 98 | 841* | 22 | 4 | 11 |

* Many of the currently annotated size-exempt dams (pre-2002 definition change) will probably be found to be of size to be regulated upon inspection. These will add to the future cost of these regulations.

**1) Projected cost to the state to implement and enforce the proposed regulation, including (a) fund source / fund detail, and (b) a delineation of one-time versus on-going expenditures**

**Program Administration:**

The current annual budget of the Department of Conservation and Recreation's Dam Safety and Floodplain Management Division is $1,322,031 pursuant to Chapter 3 of the 2006 Virginia Acts of Assembly Special Session 1 [$969,292 GF (0100), $100,000 NGF (0200), $252,739 NGF (1000)]. Of these amounts, approximately $1.18 million is available to the dam safety portion of the program. The Division's budget does contain a $350,000 GF appropriation in FY07 and FY08 only, for expenditures from the Dam Safety, Flood Prevention and Protection Assistance Fund for the associated dam repair loan program. This year, the Governor's introduced budget contained approximately $352,000 in additional general funds for dam safety operations. This remains in the budget passed by the General Assembly. The Division is already running a staffing deficit compared to other states and to recommended national dam safety program standards. These regulations will contribute to this staffing deficit. The new fees that are being established have been set low to minimize constituent impacts but high enough to derive sufficient income to support one additional full-time engineer. We do anticipate that we will have an increasing number of dam owners that we will be interacting with and the program will take additional time to implement and oversee.

New or expanded Department responsibilities may include:

1) Educating dam owners on the new provisions of the regulations such as EAP and dam break inundation zone mapping requirements, or incremental damage assessment methodologies.
2) Conducting incremental damage assessment reviews.
3) Reviewing dam break inundation zone maps to assess hazard classifications.
4) Reviews of engineering applications and plans associated with spillway upgrades.
5) Construction and Alteration project inspections.
6) Collection of fees.

**Impacts to State Dam Owners:**

State dam owners will incur the same types of costs as all other dam owners under the proposed regulations. The potential costs related to this regulatory action include the following (using the methodologies explained in question #5):

1) Development of a dam break inundation zone map
2) Development of an emergency action plan or emergency preparedness plan
3) Conducting an incremental damage assessment

4) Implementing a dam upgrade to conform with SDF requirements
5) Payment of permitting fees
6) Conducting Inspections

| **Estimated State Agency Costs Associated with the Regulation** | | |
|---|---|---|
| Category | Computations | Cost |
| Development of a dam break inundation zone map | Dams with maps already<br>45 dams *.20 = 9 dams 45 dams – 9 dams = 36 dams requiring mapping<br><br>The cost estimate associated with model and map preparation would be:<br>36 dams * $16,417 = **$591,012**<br>(Maps required every six years but will be less expensive to update in subsequent years.) | **$591,012** |
| Development of an emergency action plan or emergency preparedness plan | For Class I, II, and III dams, EAP's are already required in the current regulations although many do not contain the dam break inundation zone map. Beyond those mapping costs estimated above, the remaining EAP preparation costs are associated with completing the plan in the specified format and in exercising the plan at the specified intervals. Although there is <u>no requirement</u> for the dam owner to solicit the services of an engineer to complete the plan, it is estimated that 80% may use engineers.<br>45 dams * .80 = 36 dams * $3,125 = **$112,500**<br><br>Class IV's do not currently require any plan but the proposed requirement for an emergency preparedness plan would require the owner to complete the state form that will be available. Costs associated with the Class IV should be minimal. | **Up to $112,500** (for outside engineering services if the dam owner chooses to utilize them) |
| Conducting an incremental damage assessment | 9 dams requiring upgrades * .50 (expected %age to pursue) = 4 dams<br>4 dams * $4,500 = **$18,000**<br>(One time cost) | **$18,000** |
| Implementing a dam upgrade to conform with SDF requirements | $10,575,000 + $361,250 **= $10,936,250**<br>(Computations noted in tables below)<br>(One time cost) | **$10,936,250** |
| Payment of permitting fees | $4,767 + $4,750 = **$9,517**<br>(Annualized Regular and Conditional Certificates | **$10,417** |

| | | |
|---|---|---|
| | costs)<br>**$900** for incremental damage assessment review | |
| Conducting Inspections | 1 Class IV dam * $2,833 = $2,833 / 6 years = **$472**<br>(Annualized cost: Class IV dams will become Low Hazard dams and require an inspection by an engineer once every six years) | **$472** |

- Dam Break Inundation Zone Map computation:

| State Number of Currently Regulated Dams | | | | | | |
|---|---|---|---|---|---|---|
| **Type of Owner** | **Regular Certificate** | **Conditional Certificate** | **Current Class 4** | **Enforcement Actions** | **Under Construction** | **Total Regulated** |
| **Total** | 30 | 14 | 1 | 0 | 0 | 45 |

Dams with maps already
45 dams *.20 = 9 dams 45 dams – 9 dams = 36 dams requiring mapping

The cost estimate associated with model and map preparation would be:
36 dams * $16,417 = **$591,012**

- EAP preparation costs

In addition to the mapping costs outlined above, Class I, II, and III dam owners must develop the required plan. Although there is no requirement for the dam owner to solicit the services of an engineer to complete the plan, it is estimated that 80% may use engineers.
45 dams * .80 = 36 dams * $3,125 = **$112,500**

- Spillway upgrade cost computations are as follows:

| State Dams that May Require Spillway Upgrades | | |
|---|---|---|
| **Type of Owner** | **Compliant and required to upgrade** | **Not compliant and required to upgrade to higher standard** |
| <=15’ | 0 | 0 |
| 16’<= 25’ | 1 | 0 |
| 26’<=50’ | 7 | 1 |
| >50’ | 0 | 0 |
| **State** | 8 | 1 |

| National Dam Repair Estimates by Height of Dam | | | |
|---|---|---|---|
| **Size of Dam** | **Lower Cost** | **Higher Cost** | **Average Cost** |
| <=15’ | 145,000 | 270,000 | 207,500 |
| 16’<= 25’ | 385,000 | 535,000 | 460,000 |
| 26’<=50’ | 845,000 | 2,045,000 | 1,445,000 |
| >50’ | 5,080,000 | 10,080,000 | 7,580,000 |

According to the database, there are eight dams that are currently compliant with the regulations that may require a spillway upgrade due to the regulation changes. Costs associated with this group are as follows:

| Spillway Upgrade Costs for Compliant Dams | | | |
|---|---|---|---|
| **Size of Dam** | **Average Cost** | **Number of Dams** | **Potential Cost** |
| <=15’ | 207,500 | 0 | 0 |
| 16’<= 25’ | 460,000 | 1 | 460,000 |
| 26’<=50’ | 1,445,000 | 7 | 10,115,000 |
| >50’ | 7,580,000 | 0 | 0 |
| | | 8 | **$10,575,000** |

Additionally, there is one dam that is currently noncompliant as it already requires a spillway upgrade, but the change in the regulations will require upgrading to a higher standard. It is estimated that only 25% of the upgrade costs would be associated with upgrading to a higher standard.

| Spillway Upgrade Costs for Non Compliant Dams | | | | |
|---|---|---|---|---|
| **Size of Dam** | **Average Cost** | **Number of Dams** | **Potential Cost** | **25% of Potential Cost** |
| <=15’ | 207,500 | 0 | 0 | 0 |
| 16’<= 25’ | 460,000 | 0 | 0 | 0 |
| 26’<=50’ | 1,445,000 | 1 | 1,445,000 | 361,250 |
| >50’ | 7,580,000 | 0 | 0 | 0 |
| | | 1 | $1,445,000 | **$361,250** |

Spillway design upgrade costs would total the following;
$10,575,000 + $361,250 **= $10,936,250**

| Owners of the State Dams that May Require Spillway Upgrades Due to the Proposed Regulations | | |
|---|---|---|
| **Name of Dam** | **Height** | **Owner of Dam** |
| Newman Lake Dam | 18 | James Madison University |
| NVCC Annandale Campus Dam | 28.9 | Northern Virginia Community College |
| Lake Shenandoah | 31 | Virginia Department of Game and Inland Fisheries |
| Swift Creek Dam | 31 | Virginia Department of Conservation and Recreation |
| Goodwin Dam | 32.5 | Virginia Department of Conservation and Recreation |
| Lake Brittle | 33 | Virginia Department of Game and Inland Fisheries |
| Prince Edward Dam | 37 | Virginia Department of Conservation and Recreation |
| South River Dam #3 – Non Compliant | 47 | Virginia Department of Corrections |
| NVCC Woodbridge Campus Dam | 48.4 | Northern Virginia Community College |

Note: The dams listed here are only those that will require an upgrade due to the proposed regulations. There are additional state agency dams that are currently in need of repairs and upgrades that are not reflected in this table.

- Fee computations are as follows:

| Regular Certificates by Category | | | | |
|---|---|---|---|---|
| **Class** | **State** | **Fees** | **Total Cost over 6-years** | **Average Annual Cost** |
| I | 8 | $1,500 | 12,000 | 2,000 |
| II | 7 | $1,000 | 7,000 | 1,167 |
| III | 15 | $600 | 9,000 | 1,500 |
| IV | 1 | $600 | 600 | 100 |
| | 31 | | 28,600 | **$4,767** |

| Conditional Certificates by Category | | | | |
|---|---|---|---|---|
| **Class** | **State** | **Fees** | **Total Cost over 2-years** | **Average Annual Cost** |
| I | 2 | $1,000 | 2,000 | 1,000 |
| II | 3 | $1,000 | 3,000 | 1,500 |
| III | 9 | $500 | 4,500 | 2,250 |
| IV | 0 | $500 | 0 | 0 |
| | 14 | | 9,500 | **$4,750** |

Annualized permitting costs = **$9,517**
($4,767 + $4,750 = **$9,517**)

**Incremental Damage Assessment Review**
The fee for the review of an incremental damage analysis is $225. A re-review of an analysis is $45 per re-review. As noted previously, it is estimated that 9 dams will require a spillway upgrade associated with these regulations. We have no estimate of how many owners will request this review. If 50% required this service it would generate **$900** (4 dams * $225 = $900)

**2) Projected cost of the regulation on localities**

By having safer dams that can handle specified storm flows, localities may realize reduced repair costs following a storm as compared to the large cost associated with a failure, including replacement of the dam. If a water supply dam fails, additional sources of water may also need to be secured. A dam failure may also result in a reduction in adjacent property values and a potential loss of recreational opportunities. A dam failure may result in significant environmental impacts to downstream aquatic communities and water quality.

Localities will incur costs similar to those incurred by all other owners under the proposed regulations. The potential costs related to this regulatory action include the following (using the methodologies explained in question #5):

1) Development of a dam break inundation zone map
2) Development of an emergency action plan or emergency preparedness plan
3) Conducting an incremental damage assessment

4) Implementing a dam upgrade to conform with SDF requirements
5) Payment of permitting fees
6) Conducting Inspections

An analysis of the database indicated that of the currently regulated dams, there are 114 dams owned by localities (counties, cities, and towns), 20 owned by service authorities, and 104 dams owned or maintained by local Soil and Water Conservation Districts. For the purposes of this computation, this yields a total of 238 dams.

| **Estimated Locality Costs Associated with the Regulation** | | |
|---|---|---|
| Category | Computations | Cost |
| Development of a dam break inundation zone map | Dams with maps already<br>238 dams *.20 = 47 dams 238 dams – 47 dams = 44 dams requiring mapping<br><br>The cost estimate associated with model and map preparation would be:<br>191 dams * $16,417 = **$3,135,647**<br>(Maps required every six years but will be less expensive to update in subsequent years.) | **$3,135,647** |
| Development of an emergency action plan or emergency preparedness plan | For Class I, II, and III dams, EAP's are already required in the current regulations although many do not contain the dam break inundation zone map. Beyond those mapping costs estimated above, the remaining EAP preparation costs are associated with completing the plan in the specified format and in exercising the plan at the specified intervals. Although there is <u>no requirement</u> for the dam owner to solicit the services of an engineer to complete the plan, it is estimated that 80% may use engineers.<br>238 dams * .80 = 190 dams * $3,125 = **$593,750**<br><br>Class IV's do not currently require any plan but the proposed requirement for an emergency preparedness plan would require the owner to complete the state form that will be available. Costs associated with the Class IV should be minimal. | **Up to $593,750** (for outside engineering services if the dam owner chooses to utilize them) |
| Conducting an incremental damage assessment | 53 dams requiring upgrades * .50 (expected %age to pursue) = 26 dams<br>26 dams * $4,500 = **$117,000**<br>(One time cost) | **$117,000** |
| Implementing a dam | $90,210,000 + $12,726,250 **= $102,936,250** | **$102,936,250** |

| | | |
|---|---|---|
| upgrade to conform with SDF requirements | (Computations noted in tables below)<br>(One time cost) | |
| Payment of permitting fees | $17,717 + $15,750 = **$33,467**<br>(Annualized Regular and Conditional Certificates costs)<br>**$4,050** for incremental damage assessment review | **$37,517** |
| Conducting Inspections | 5 Class IV dam * $2,833 = $14,165 / 6 years = **$2,361**<br>(Annualized cost: Class IV dams will become Low Hazard dams and require an inspection by an engineer once every six years) | **$2,361** |

- Dam Break Inundation Zone Map computation:

| **Locality Number of Currently Regulated Dams** | | | | | | |
|---|---|---|---|---|---|---|
| **Type of Owner** | **Regular Certificate** | **Conditional Certificate** | **Current Class 4** | **Enforcement Actions** | **Under Construction** | **Total Regulated** |
| **Local Gov. Total** | 97 | 31 | 5 | 1 | 0 | 134 |
| **SWCD Total** | 83 | 21 | 0 | 0 | 0 | 104 |
| **Total** | | | | | | 238 |

Dams with maps already
238 dams *.20 = 47 dams 238 dams – 47 dams = 191 dams requiring mapping

The cost estimate associated with model and map preparation would be:
191 dams * $16,417 = **$3,135,647**

- EAP preparation costs

In addition to the mapping costs outlined above, Class I, II, and III dam owners must develop the required plan. Although there is no requirement for the dam owner to solicit the services of an engineer to complete the plan, it is estimated that 80% may use engineers.
238 dams * .80 = 190 dams * $3,125 = **$593,750**

- Spillway upgrade cost computations are as follows:

**Size and Category of Regulated Local Dams Requiring Spillway Upgrades**

| Type of Owner | Compliant and required to upgrade | Not compliant and required to upgrade to higher standard |
|---|---|---|
| | | |
| <=15’ | 0 | 0 |
| 16’<= 25’ | 0 | 0 |
| 26’<=50’ | 12 | 1 |
| >50’ | 2 | 2 |
| **Soil and Water Conservation Districts** | 14 | 3 |
| | | |
| <=15’ | 0 | 0 |
| 16’<= 25’ | 3 | 0 |
| 26’<=50’ | 18 | 8 |
| >50’ | 4 | 3 |
| **Local Governments** | 25 | 11 |
| | | |
| <=15’ | 0 | 0 |
| 16’<= 25’ | 3 | 0 |
| 26’<=50’ | 30 | 9 |
| >50’ | 6 | 5 |
| **Total** | 39 | 14 |

| National Dam Repair Estimates by Height of Dam | | | |
|---|---|---|---|
| **Size of Dam** | **Lower Cost** | **Higher Cost** | **Average Cost** |
| <=15’ | 145,000 | 270,000 | 207,500 |
| 16’<= 25’ | 385,000 | 535,000 | 460,000 |
| 26’<=50’ | 845,000 | 2,045,000 | 1,445,000 |
| >50’ | 5,080,000 | 10,080,000 | 7,580,000 |

According to the database, there are 39 dams that are currently compliant with the regulations that may require a spillway upgrade due to the regulation changes. Costs associated with this group are as follows:

| Spillway Upgrade Costs for Compliant Dams | | | |
|---|---|---|---|
| **Size of Dam** | **Average Cost** | **Number of Dams** | **Potential Cost** |
| <=15’ | 207,500 | 0 | 0 |
| 16’<= 25’ | 460,000 | 3 | 1,380,000 |
| 26’<=50’ | 1,445,000 | 30 | 43,350,000 |
| >50’ | 7,580,000 | 6 | 45,480,000 |
| | | 39 | **$90,210,000** |

Additionally, there are 14 dams that are currently noncompliant, as they already require a spillway upgrade, but the change in the regulations will require upgrading to a higher standard. It is estimated that only 25% of the upgrade costs would be associated with upgrading to a higher standard.

| Spillway Upgrade Costs for Non Compliant Dams | | | | |
|---|---|---|---|---|
| **Size of Dam** | **Average Cost** | **Number of Dams** | **Potential Cost** | **25% of Potential Cost** |
| <=15’ | 207,500 | 0 | 0 | 0 |
| 16’<= 25’ | 460,000 | 0 | 0 | 0 |
| 26’<=50’ | 1,445,000 | 9 | 13,005,000 | 3,251,250 |
| >50’ | 7,580,000 | 5 | 37,900,000 | 9,475,000 |
| | | 14 | $50,905,000 | **$12,726,250** |

Spillway design upgrade costs would total the following;
$90,210,000 + $12,726,250 **= $102,936,250**

- Fee computations are as follows:

NOTE: Section 4 VAC 50-20-360 states that impounding structures owned by Virginia Soil and Water Conservation Districts shall be exempt from all fees.

| Regular Certificates by Category | | | | |
|---|---|---|---|---|
| **Class** | **Local Gov.** | **Fees** | **Total Cost over 6-years** | **Average Annual Cost** |
| I | 37 | $1,500 | 55,500 | 9,250 |
| II | 34 | $1,000 | 34,000 | 17,000 |
| III | 26 | $600 | 15,600 | 2,600 |
| IV | 2 | $600 | 1,200 | 200 |
| | 99 | | 106,300 | **$17,717** |

| Conditional Certificates by Category | | | | |
|---|---|---|---|---|
| **Class** | **Local Gov.** | **Fees** | **Total Cost over 2-years** | **Average Annual Cost** |
| I | 23 | $1,000 | 23,000 | 11,500 |
| II | 5 | $1,000 | 5,000 | 2,500 |
| III | 4 | $500 | 2,000 | 1,000 |
| IV | 3 | $500 | 1,500 | 750 |
| | 35 | | 31,500 | **$15,750** |

Annualized permitting costs = **$33,467**
($17,717 + $15,750 = **$33,467**)

**Incremental Damage Assessment Review**
The fee for the review of an incremental damage analysis is $225. A re-review of an analysis is $45 per re-review. It is estimated that 36 dams (SWCD dams have been removed) will require a spillway upgrade associated with these regulations. We have no estimate of how many owners

will request this review. If 50% required this service it would generate **$4,050** (26 dams * $225 = **$4,050**)

**3) Description of the individuals, businesses or other entities likely to be affected by the regulation**

The proposed regulations will affect dam owners, both public and private, including private individuals, homeowner's associations and other similar entities; local governments, Soil and Water Conservation Districts, Watershed Improvement Districts, state agencies, and public colleges and universities. The proposed regulations will also affect dam safety engineering firms and private contractors that perform dam maintenance and repair work. The proposed regulations will also affect individuals and entities owning property downstream of impounding structures and the public at large through increased safety in impounding structure design, construction, alteration, operation, and maintenance.

**4) Agency's best estimate of the number of such entities that will be affected. Please include an estimate of the number of small businesses affected.** Small business means a business entity, including its affiliates, that (i) is independently owned and operated and (ii) employs fewer than 500 full-time employees or has gross annual sales of less than $6 million.

The Commonwealth and the public at large will benefit from the proposed regulations through increased impounding structure safety. Likewise, an indeterminable number of downstream property owners will be benefited through increased safety of their properties.

For the 581 currently regulated dams, 530 private individuals and entities currently own impounding structures that are subject to the proposed regulations and that may be affected by them, at least in part. In addition, five state agencies, four public colleges and universities, 58 Virginia localities, 10 service authorities, one Watershed Improvement District, and 12 Soil and Water Conservation Districts own or maintain state regulated impounding structures subject to the requirements of the Dam Safety Act, and may be affected by provisions of the proposed regulations.

While the proposed regulations are not anticipated to have an adverse effect upon small businesses, they may have some impact upon engineering and contracting firms that perform maintenance and repair work to impounding structures; some of these enterprises may be small businesses. Currently, we are aware of approximately 60 engineers offering services to dam owners in the Commonwealth; these engineers represent 46 different engineering firms. The number of contractors is not susceptible to calculation, as contractors often vary project to project; few specialize in dam repairs.

**5) All projected costs of the regulation for affected individuals, businesses, or other entities. Please be specific. Be sure to include the projected reporting, recordkeeping, and other administrative costs required for compliance by small businesses.**

The potential costs related with this regulatory action include the following:

A) Development of a dam break inundation zone map
B) Development of an emergency action plan or emergency preparedness plan
C) Conducting an incremental damage assessment
D) Implementing a dam upgrade to conform with SDF requirements
E) Payment of permitting fees
F) Conducting Inspections

| **Estimated Total Costs Associated with the Regulation** | | |
|---|---|---|
| Category | Computations | Cost |
| Development of a dam break inundation zone map | Dams with maps already<br>581 dams *.20 = 116 dams 581 dams – 116 dams = 465 dams requiring mapping<br><br>The cost estimate associated with model and map preparation would be:<br>465 dams * $16,417 = **$7,633,905**<br>(Maps required every six years but will be less expensive to update in subsequent years.)<br>(computations noted in tables below) | **$7,633,905** |
| Development of an emergency action plan or emergency preparedness plan | For Class I, II, and III dams, EAP's are already required in the current regulations although many do not contain the dam break inundation zone map. Beyond those mapping costs estimated above, the remaining EAP preparation costs are associated with completing the plan in the specified format and in exercising the plan at the specified intervals. Although there is <u>no requirement</u> for the dam owner to solicit the services of an engineer to complete the plan, it is estimated that 80% may use engineers.<br>581 dams * .80 = 464 dams * $3,125 = **$1,450,000**<br><br>Class IV's do not currently require any plan but the proposed requirement for an emergency preparedness plan would require the owner to complete the state form that will be available. Costs associated with the Class IV should be minimal. | **Up to $1,450,000** (for outside engineering services if the dam owner chooses to utilize them) |
| Conducting an incremental damage assessment | 166 dams requiring upgrades * .50 (expected %age to pursue) = 83 dams<br>83 dams * $4,500 = **$373,500**<br>(One time cost)<br>(Computations noted in tables below) | **$373,500** |

| | | |
|---|---|---|
| Implementing a dam upgrade to conform with SDF requirements | $223,397,500 + $25,556,875 = **$248,954,375**<br>(One time cost)<br>(Computations noted in tables below) | **$248,954,375** |
| Payment of permitting fees | Construction Permit Application = **$10,500**<br>Regular Operation and Maintenance Certificate Application = **$49,500**<br>Conditional Operation and Maintenance Certificate Application = **$49,250**<br>Incremental Damage Analysis Review = **$18,675**<br>**Estimated Total = $127,925**<br>(This represents annualized fees paid by dam owners but revenue to the Department.)<br>(Computations noted in tables below) | **$127,925** |
| Conducting Inspections | 30 Class IV dam * $2,833 = $84,990 / 6 years = **$14,165**<br>(Annualized cost: Class IV dams will become Low Hazard dams and require an inspection by an engineer once every six years) (Currently there are no requirements for an inspection by an engineer on Class IV dams.) | **$14,165** |

**A) Development of a dam break inundation zone map**

Section 4VAC50-20-54 includes a requirement for dam owners to have a dam break inundation zone map completed by a licensed professional engineer for hazard potential class determinations. It also specifies that the map is required for High and Significant Hazard dams as part of their Emergency Action Plan (EAP). Maps shall be submitted every 6 years as part of the re-certification process.

There are currently 581 dams that would require a dam break inundation zone map be completed.

| **Total Number of Currently Regulated Dams** | | | | | | |
|---|---|---|---|---|---|---|
| **Type of Owner** | **Regular Certificate** | **Conditional Certificate** | **Current Class 4** | **Enforcement Actions** | **Under Construction** | **Total Regulated** |
| **Total** | 400 | 128 | 30 | 8 | 15 | 581 |

The development of a dam break inundation zone map includes two primary elements: (1) a detailed survey with a benchmark; and (2) a hydraulic computer model run with mapping of sunny day failure, mapping of the PMF with a complete failure, and mapping of the PMF without a dam failure. Estimates provided by engineering firms ranged from $6,000 to $35,000. The midpoint cost average for the three firms was estimated to be $16,417.

As dam break inundation zone mapping is already an important component of many EAP's prepared for high hazard dams it would be reasonable to estimate that 20% of dam owners already complete this mapping exercise.
581 dams *.20 = 116 dams 581 dams – 116 dams = 465 dams requiring mapping

The cost estimate associated with model and map preparation would be:
465 dams * $16,417 = **$7,633,905** [1,2]

**Notes:**
1) It should be noted that a number of dam owners already have partial modeling information available that may reduce preparation costs.

2) It should also be noted that the maps should be good for 6 years unless circumstances change below the dam and that updates would routinely be much less costly in subsequent years. If no development has occurred, no updates would be necessary.

**B) Development of an emergency action plan or emergency preparedness plan**
Section 4VAC50-20-175 requires the development of an emergency action plan for High and Significant Hazard dams. EAP's are already required in the current regulations for Class I, II, and III structures [4VAC5-20-70 (B) (17); 110 (B); and 120 (B) (4)] although the requirements are made more prominent and detailed in the proposed regulations. Many EAP's do not contain the dam break inundation zone map discussed above. Beyond those mapping costs estimated above, the remaining EAP preparation costs are associated with completing the plan in the specified format and in exercising the plan at the specified intervals. Although there is no requirement for the dam owner to solicit the services of an engineer to complete the plan, it is estimated that 80% may use engineers.

Section 4VAC50-20-177 requires the development of an emergency preparedness plan for Low hazard dams. Class IV's do not currently require any plan and only a simple map but the proposed requirement for an emergency preparedness plan would require the owner to complete the state form that will be available. Costs associated with the Class IV should be minimal.

The Department will need to work with dam owners to educate them of the new requirements.

In addition to the mapping costs outlined above, Class I, II, and III dam owners must develop the required plan. Although there is no requirement for the dam owner to solicit the services of an engineer to complete the plan, it is estimated that 80% may use engineers.
581 dams * .80 = 464 dams * $3,125 = **$1,450,000**

**C) Conducting an incremental damage assessment**
Section 4VAC50-20-52 makes incremental damage analysis available to all dam owners as a means of determining if their spillway design capacity requirement may be reduced. Although not currently available to all dam owners as these amendments would now allow for, very few dam owners qualified for or utilized this alternative in the past.

Of the 1,731 dams in the database, it was determined that 325 were compliant and not in need of any spillway upgrades due to these regulations. An additional 50 dams are currently in need of spillway upgrades but are not affected further by these regulations. However, it is estimated that 166 dams will require a spillway upgrade to comply with these regulations.

| Type of Owner | Compliant and required to upgrade | Not compliant and required to upgrade to higher standard | Total |
|---|---|---|---|
| **State** | 8 | 1 | 9 |
| **Soil and Water Conservation Districts** | 14 | 3 | 17 |
| **Local Governments** | 25 | 11 | 36 |
| **Private** | 80 | 24 | 104 |
| **Total** | 127 | 39 | 166 |

Estimates provided by engineering firms ranged from $2,000 to $10,000 to conduct an incremental analysis. The midpoint cost average for the three firms was estimated to be $4,500.

It is estimated that 50% of the dams may be expected to pursue the analysis (166 dams * .50 = 83 dams).

The cost estimate associated with incremental analysis for 83 dams would be:
83 dams * $4,500 = **$373,500**

**D) Implementing a dam upgrade to conform with SDF requirements**

Due to changes in required spillway design requirements set out in Section 4VAC50-20-50 (Table 1), it is estimated that of the 1,731 dams in the database, at least 166 regulated dams will require a spillway upgrade. The size distribution of these dams and the compliance level of these dams are outlined below.

| Size and Category of Regulated Dam Requiring Spillway Upgrades | | |
|---|---|---|
| **Type of Owner** | **Compliant and required to upgrade** | **Not compliant and required to upgrade to higher standard** |
| <=15’ | 0 | 0 |
| 16’<= 25’ | 1 | 0 |
| 26’<=50’ | 7 | 1 |
| >50’ | 0 | 0 |
| **State** | 8 | 1 |
| | | |
| <=15’ | 0 | 0 |
| 16’<= 25’ | 0 | 0 |
| 26’<=50’ | 12 | 1 |

| | | |
|---|---|---|
| >50’ | 2 | 2 |
| **Soil and Water Conservation Districts** | 14 | 3 |
| | | |
| <=15’ | 0 | 0 |
| 16’<= 25’ | 3 | 0 |
| 26’<=50’ | 18 | 8 |
| >50’ | 4 | 3 |
| **Local Governments** | 25 | 11 |
| | | |
| <=15’ | 7 | 1 |
| 16’<= 25’ | 9 | 2 |
| 26’<=50’ | 60 | 18 |
| >50’ | 4 | 3 |
| **Private** | 80 | 24 |
| | | |
| <=15’ | 7 | 1 |
| 16’<= 25’ | 13 | 2 |
| 26’<=50’ | 97 | 28 |
| >50’ | 10 | 8 |
| **Total** | 127 | 39 |

A report entitled “The Cost of Rehabilitating our Nation’s Dams: A Methodology, Estimate, and Proposed Funding Mechanisms; Prepared by a Task Committee of the Association of State Dam Safety Officials; December 2002, Revised October 2003” is utilized to provide dam rehabilitation costs. Costs include the engineering assessment and the remedial action.

| **National Dam Repair Estimates by Height of Dam** | | | |
|---|---|---|---|
| **Size of Dam** | **Lower Cost** | **Higher Cost** | **Average Cost** |
| <=15’ | 145,000 | 270,000 | 207,500 |
| 16’<= 25’ | 385,000 | 535,000 | 460,000 |
| 26’<=50’ | 845,000 | 2,045,000 | 1,445,000 |
| >50’ | 5,080,000 | 10,080,000 | 7,580,000 |

Although dam repair information specific to Virginia is not readily available, the estimates or actual costs associated with spillway upgrades that are known are typically within the ranges set out above.

According to the database, there are 127 dams that are currently compliant with the regulations that may require a spillway upgrade due to the regulation changes. Costs associated with this group are as follows:

| **Size of Dam** | **Average Cost** | **Number of Dams** | **Potential Cost** |
|---|---|---|---|
| <=15’ | 207,500 | 7 | 1,452,500 |
| 16’<= 25’ | 460,000 | 13 | 5,980,000 |

| | | | |
|---|---|---|---|
| 26'<=50' | 1,445,000 | 97 | 140,165,000 |
| >50' | 7,580,000 | 10 | 75,800,000 |
| | | 127 | **$223,397,500** |

Additionally, there are 39 dams that are currently noncompliant, as they already require a spillway upgrade, but the change in the regulations will require upgrading to a higher standard. It is estimated that only 25% of the upgrade costs would be associated with upgrading to a higher standard.

| Size of Dam | Average Cost | Number of Dams | Potential Cost | 25% of Potential Cost |
|---|---|---|---|---|
| <=15' | 207,500 | 1 | 207,500 | 51,875 |
| 16'<= 25' | 460,000 | 2 | 920,000 | 230,000 |
| 26'<=50' | 1,445,000 | 28 | 40,460,000 | 10,115,000 |
| >50' | 7,580,000 | 8 | 60,640,000 | 15,160,000 |
| | | 39 | 102,227,500 | **$25,556,875** |

Spillway design upgrade costs would total the following:
$223,397,500 + $25,556,875 = **$248,954,375** **1, 2, 3, 4, 5, 6**

**Significant Qualifiers:**

1) Although the use of the incremental damage assessment to reduce the required spillway design requirements will occur and will result in a reduction in these overall cost estimates, we are unable to precisely calculate the magnitude of use and the resulting cost reductions. For the purposes of this exercise we have estimated the use to be at 50% of those dams believed to require a spillway upgrade.

2) Due to the delayed effective date language provided in 4VAC50-20-125 the costs associated with the currently compliant dams could be spread over as many as 11 years ($223 million/ 11 years = $20 million per year). The owner has between 3 to 6 years to submit an Alteration Permit Application to address spillway capacity upgrades depending on their required recertification date. The Alteration Permit Application is to contain a construction sequence with milestones for completing the necessary improvements within 5 years of Alteration Permit issuance.

3) On the other hand, costs will continue to rise. An engineer familiar with dam rehabilitation costs suggested that since the cost figures were developed in the 2002 ASDSO report (revised 2003), they may have increased by 30 to 40%. The trade journal Engineering News-Record (ENR) suggests that in the first 2 ½ months of 2007, both construction and building cost indices have already increased by approximately 2%.

4) The Department is currently working with the Virginia Resources Authority to develop a funding assistance program to provide qualified dam owners with low interest loans for dam repairs. To date, the Governor and the General Assembly have provided $350,000 in both FY07 and FY08 to help start the program.

5) Many of the dams currently identified as size-exempt in the Department's database may be found to be of regulated size upon inspection and may add to the future cost of these regulations. Until these dams are inspected and more is known about them, the Department cannot draw conclusions about their ultimate costs.

6) No price tag can be placed on the lives that could be lost in the future due to dam failure.

**E. Payment of permitting fees**

The regulations allow for fees to be assessed for the following permits, certificates, and actions:
1) Construction Permit Application [4 VAC 50-20-370]
2) Regular Operation and Maintenance Certificate Application [4 VAC 50-20-380]
3) Conditional Operation and Maintenance Certificate Application [4 VAC 50-20-390]
4) Incremental Damage Analysis Review [4 VAC 50-20-400]

The new fees that are being established have been set low to minimize constituent impacts but high enough to derive sufficient annual income to support one additional full-time engineer.

NOTE: Section 4 VAC 50-20-360 states that impounding structures owned by Virginia Soil and Water Conservation Districts shall be exempt from all of these fees.

**1) Construction Permit Application Fee**

Currently, 15 dams are under construction in Virginia (1 High, 8 Significant, 6 Low). It is estimated that no more than six dams per year are issued permits. If all the dams were Low Hazard, the revenue would be **$6,000** per year (6 dams * $1,000 = $6,000). If the dams were High or Significant Hazard, the revenue would be **$15,000** (6 dams * $2,500 = $15,000). Averaging these two figures together yields an average cost of **$10,500 per year.**

**2) Regular Operation and Maintenance Certificate Application**

Regular certificates will result in an estimated $49,500 per year in revenue.

| **Regular Certificates by Category** | | | | | |
|---|---|---|---|---|---|
| **Class** | **SWCD*** | **State** | **Local Gov.** | **Private** | **Total minus SWCD** |
| I | 10 | 8 | 37 | 15 | 60 |
| II | 10 | 7 | 34 | 61 | 102 |
| III | 63 | 15 | 26 | 114 | 155 |
| IV** | 0 | 1 | 2 | 17 | 20 |
| | 83 | 31 | 99 | 207 | 337 |

* SWCD's are exempt from the fee regulations and have been excluded from totals.
** Dams that are Class IV, and that have spillways that are compliant with the proposed regulations, are considered eligible for a regular certificate.

| Regular Certificates by Category | | | | |
|---|---|---|---|---|
| **Class** | **Total minus SWCD** | **Fees** | **Total Revenue over 6-years** | **Average Annual Revenue** |
| I | 60 | $1,500 | 90,000 | 15,000 |
| II | 102 | $1,000 | 102,000 | 17,000 |
| III | 155 | $600 | 93,000 | 15,500 |
| IV** | 20 | $600 | 12,000 | 2,000 |
| | 337 | | 297,000 | **$49,500** |

**3) Conditional Operation and Maintenance Certificate Application**

Conditional certificates will result in an estimated **$49,250** per year in revenue.

| Conditional Certificates by Category | | | | | |
|---|---|---|---|---|---|
| **Class** | **SWCD*** | **State** | **Local Gov.** | **Private** | **Total minus SWCD** |
| I | 14 | 2 | 23 | 11*** | 36 |
| II | 6 | 3 | 5 | 28*** | 36 |
| III | 1 | 9 | 4*** | 30*** | 43 |
| IV** | 0 | 0 | 3 | 7 | 10 |
| | 21 | 14 | 35 | 76 | 125 |

* SWCD's are exempt from the fee regulations and have been excluded from totals.
** Dams that are Class IV, and that have spillways that are not compliant with the proposed regulations, are considered eligible for a conditional certificate.
*** Includes Class I, II, or III "Enforcement Action" Dams

| Conditional Certificates by Category | | | | |
|---|---|---|---|---|
| **Class** | **Total minus SWCD** | **Fees** | **Total Revenue over 2-years** | **Average Annual Revenue** |
| I | 36 | $1,000 | 36,000 | 18,000 |
| II | 36 | $1,000 | 36,000 | 18,000 |
| III | 43 | $500 | 21,500 | 10,750 |
| IV** | 10 | $500 | 5,000 | 2,500 |
| | 125 | | 98,500 | **$49,250** |

**4) Incremental Damage Analysis Review**
The fee for the review of an incremental damage analysis is $225. A re-review of an analysis is $45 per re-review. As noted previously, it is estimated that 166 dams will require a spillway upgrade associated with these regulations. We have no estimate of how many owners will request this review. If 50% required this service it would generate **$18,675** (83 dams * $225 = $18,675)

**5) Total Annual Fee Revenue**

Total annual revenue under the proposed regulations is estimated to be $127,925 per year.

| Annual Fee Revenue Estimate | |
|---|---|
| Fee Source | Annual Fee |
| Construction Permit Application | **$10,500** |
| Regular Operation and Maintenance Certificate Application | **$49,500** |
| Conditional Operation and Maintenance Certificate Application | **$49,250** |
| Incremental Damage Analysis Review | **$18,675** |
| **Estimated Total** | **$127,925** |

**F. Conducting Inspections**

Periodic inspections of all dams by licensed profession engineers to ensure their structural safety are required pursuant to 4 VAC 50-20-105. For Low hazard dams this will become once every 6 years under the proposed regulations.

Estimates provided by engineering firms ranged from $1,000 to $8,000 to conduct an inspection and generate a report. The midpoint cost average for the three firms was estimated to be $2,833.

30 Class IV dam * $2,833 = $84,990 / 6 years = **$14,165**
(Annualized cost: Class IV dams will become Low Hazard dams and require an inspection by an engineer once every six years.) (Currently there are no requirements for an inspection by an engineer on Class IV dams.)

## Alternatives

*Please describe any viable alternatives to the proposal considered and the rationale used by the agency to select the least burdensome or intrusive alternative that meets the essential purpose of the action. Also, include discussion of less intrusive or less costly alternatives for small businesses, as defined in §2.2-4007.1 of the Code of Virginia, of achieving the purpose of the regulation.*

The adoption of regulations that ensure that impounding structures in the Commonwealth are properly and safely constructed, maintained and operated is mandated by § 10.1-605. The present regulatory action constitutes the first comprehensive review of these regulations since 1989; it is believed that there is no alternative to the current action that sufficiently protects public safety based on current understandings. The current Impounding Structure Regulations contain vague language and confusing references to new and existing dams, outdated required forms, and sections that lack adequate explanation in the application of or interpretation of procedures contained within; maintaining the regulations as they currently are will significantly hamper the efforts of the Board to strengthen the Dam Safety Program and to ensure the safety of impounding structures. The proposed regulations, which are intended to address the above-noted concerns, were developed in consultation with a 28-member technical advisory committee over a nearly six-month period.

During the development of the proposed regulations, the utilization of an alternative decision matrix for spillway design capacity requirements was considered. This matrix would have permitted spillways to be constructed and maintained at lesser levels than required by the proposed regulations if certain non-structural criteria were satisfied. This approach was ultimately not selected due to its failure to ensure adequate protection of life and property. Instead, the proposed regulations allow for a reduction in spillway capacity following the development of an incremental damage analysis, which demonstrates the level at which the spillway capacity of an impounding structure poses no unacceptable additional downstream threat. Establishing different design standards for new and existing impounding structures was also a topic considered. Based on the observation that the threat to the public is not dependant upon the age of the impounding structure, but rather upon its design capabilities and condition, it was determined that there was no justifiable basis for treating existing structures differently from new structures.

The proposed regulations are not anticipated to have an adverse impact on small businesses; thus, no less intrusive or less costly alternatives for small businesses are believed to be applicable to the current action.

At the urging and request of the TAC, the Department is also exploring the development of legislation that would address the significant issue of how development within dam break inundation zones often results in upstream dam owners becoming responsible for costly upgrades to their dams to meet increased dam safety spillway standards that are applied as a result of this downstream development. The dam owners are required to make these improvements to address hazard potential even though their impounding structures would meet state standards in the absence of the development. Although the legislation would not alleviate the need for or the cost of the repairs, it may call for the developer to assist with the costs of the necessary repairs.

## Regulatory flexibility analysis

*Please describe the agency's analysis of alternative regulatory methods, consistent with health, safety, environmental, and economic welfare, that will accomplish the objectives of applicable law while minimizing the adverse impact on small business. Alternative regulatory methods include, at a minimum: 1) the establishment of less stringent compliance or reporting requirements; 2) the establishment of less stringent schedules or deadlines for compliance or reporting requirements; 3) the consolidation or simplification of compliance or reporting requirements; 4) the establishment of performance standards for small businesses to replace design or operational standards required in the proposed regulation; and 5) the exemption of small businesses from all or any part of the requirements contained in the proposed regulation.*

---

The proposed regulations are not anticipated to have an adverse impact on small businesses; thus, no alternative regulatory methods are believed to be applicable to the current action. Some engineering and contracting enterprises that perform dam design, maintenance, repairs, and upgrades pursuant to the proposed regulations may be small businesses. In consultation with the technical advisory committee, it is believed that the proposed regulations will benefit these enterprises by removing required reporting forms from the regulations to allow for easier and more efficient updating to promote clarity and ease of use. Reporting deadlines and required submissions for design, repairs, and upgrades have additionally been established at levels

believed to be the least intrusive available that still adequately provide for public safety during the design, repair, and/or upgrade process.

## Public comment

*Please summarize all comments received during public comment period following the publication of the NOIRA, and provide the agency response.*

The public comment period for the Notice of Intended Regulatory Action (NOIRA) opened on December 26, 2005 and closed 60 days later on February 24, 2006 at 5:00 p.m. Additionally, one public meeting was held on February 9, 2006 in Charlottesville. A total of 77 people took advantage of the comment period by either attending the meeting or submitting written comments. Forty-four people attended the public meeting in Charlottesville with 19 people speaking (primarily dam owners, a few localities, and engineering companies).

In total, 52 comments were received during the NOIRA public comment period following the publication of the NOIRA. Of these, 19 individuals and entities submitted both verbal comments at a public meeting and written comments; 33 submitted written comments only. A summary of these earlier comments and current responses are set forth below. The Agency responses are reflective of considerations and recommendations offered by the TAC and the Board to date.

(Please note that several of the commenters were represented on the 28-member TAC that was assembled to discuss the issues raised during the comment period and in the NOIRA.)

| Commenter | Comment | Agency response (following conclusion of the TAC) |
|---|---|---|
| Lake of the Woods Association, Inc. (Neil Buttimer); Dr. Peter G. Rainey; Donald J. Cope; Peter J. Williams; Lake Forest Homeowners Association (Rodger Reynolds); Amherst County Service Authority (Dan E. French); Lake Barcroft Watershed Improvement District (Davis F. Grant); Jim Hopkins | PMF is not a "probable" event; it is a theoretical event. | Data shows that severe rainfall events approaching the PMF can and do occur. Virginia, as evidenced by a presentation made to the technical advisory committee, is in fact situated such that these events must be considered in ensuring the safe design, construction, and operation of impounding structures. To illustrate the point, two of the five most intense 12-hour storm events in recorded United States history occurred in Virginia (Nelson County in 1969 and Madison County in 1995). A third also occurred in the greater Mid-Atlantic region (Smethport, PA in 1942). |
| Lake of the Woods Association, Inc. (Neil Buttimer); Amherst County Service Authority (Dan E. French); Jim Hopkins | PMF as a standard for dam safety design is much higher than that used for any other engineered system. | PMF, or "probable maximum flood," is a standard used in the design of impounding structure spillways; DCR and the Board are not aware of any usage of the standard in other areas of engineering, and has no basis for comparing it to engineering standards employed in other contexts. It is worth noting, however, that the PMF standard is used for high hazard dams in the federal system and in other states, including Maryland, Pennsylvania, South |

| | | |
|---|---|---|
| | | Carolina, Massachusetts, Idaho, Arizona, and Arkansas. Still other states use a similar PMP, or "probable maximum precipitation," standard, including North Carolina, West Virginia, Kentucky, Tennessee, New Jersey, and Georgia. |
| Lake of the Woods Association, Inc. (Neil Buttimer); Donald J. Cope; Louis O. Goodwin; Woodhaven Property Owners Association, Inc. (John Bock); Amherst County Service Authority (Dan E. French); Lake Barcroft Watershed Improvement District (Davis F. Grant) | PMF may be justified as a standard for new dams, as the marginal cost to achieve that standard before construction is relatively small. | It is understood that the costs of building a new dam to pass the PMF may be less than those of retrofitting an existing dam to the same standard. Dangers to the public, however, are not dependent on whether a dam is new or pre-existing; and there is no substitute for the level of safety provided by the safe design and operation of a dam. Therefore, there is no defensible reason for treating new and existing dams differently. |
| Lake of the Woods Association, Inc. (Neil Buttimer); Amherst County Service Authority (Dan E. French); Lake Barcroft Watershed Improvement District (Davis F. Grant); Doug Crain | For communities contiguous to dams, the disruptions associated with construction can have a severe social impact, and affect property values. | It is understood that construction and alteration activities conducted on dams can impact the surrounding community during the time that the activities are being conducted. Still, these disruptions are temporary in nature, and in most cases limited to the area of the impounding structure itself. These temporary inconveniences pale in comparison to the devastation that can result from the failure of a dam. |
| Lake of the Woods Association, Inc. (Neil Buttimer); Amherst County Service Authority (Dan E. French); Lake Barcroft Watershed Improvement District (Davis F. Grant) | Disturbing the integrity of a well maintained existing dam to upgrade spillway carries inherent risks. | The proposed regulations require that any alteration of an existing impounding structure in a way that could affect its structural integrity be conducted pursuant to an alteration permit issued by the Board (4VAC50-20-60). All alteration permit applications must be accompanied by a design report prepared by a licensed professional engineer which includes plans and specifications that demonstrate that the structure will be stable during all phases of construction (4VAC50-20-80(13)). In addition, the proposed regulations require inspections, monitoring, and testing during alteration to ensure the safety of the structure as work progresses (4VAC50-20-180(B)). |
| Lake of the Woods Association, Inc. (Neil Buttimer); Homeowners Association (Rodger Reynolds); Gary Sjordal; John Taylor; Forest Lakes Property Owners Association (Craig Szczutkowski and Sharon Sitterley); Jim Hopkins | More realistic estimates, such as the 100-year storm, should be used for the standard for assessing whether existing dams pose an unreasonable hazard to public safety. | Data shows that severe rainfall events approaching the PMF can and do occur. Virginia, as evidenced by a presentation made to the technical advisory committee, is in fact situated such that these events must be considered in ensuring the safe design, construction, and operation of impounding structures. To illustrate the point, two of the five most intense 12-hour storm events in recorded United States history occurred in Virginia (Nelson County in 1969 and Madison County in 1995). A third also occurred in the Mid-Atlantic region (Smethport, PA in 1942). |

| | | |
|---|---|---|
| Lake of the Woods Association, Inc. (Neil Buttimer)<br>Lake Holiday (Chris Allison); Homeowners Association (Rodger Reynolds); Amherst County Service Authority (Dan E. French) | Many other states have established criteria that permit consideration of less than a full PMF spillway capacity, especially for existing dams. | It is of note that the proposed regulations require PMF spillway design only for high hazard dams (those where failure will cause probable loss of life or serious economic damage) and for the largest of the significant hazard dams (those where failure may cause the loss of life or appreciable economic damage). Even for these dams, however, the proposed regulations do establish an incremental damage assessment criteria by which lesser spillway capacity designs may be considered where appropriate (4VAC50-20-52). |
| Lake of the Woods Association, Inc. (Neil Buttimer);<br>Lake Holiday (Chris Allison);<br>Town of Purcellville (Karin Fellers); Lake of the Woods Association, Inc. (John S. Bailey); Gary Sjordal; Louis O. Goodwin; Raymond N. Zogran ; Josephine M. Zogran; Reston Association (Milton W. Matthews and Larry T. Butler); Woodhaven Property Owners Association, Inc. (John Bock); Culpeper Soil and Water Conservation District (Greg Wichelns); Amherst County Service Authority (Dan E. French); Lake Barcroft Watershed Improvement District (Davis F. Grant); James Marshall; Fairfax County (Donald Demetrius); Town of Wise (Sal Odierno); Ernest Meier; Lake Front Royal Property Owners Association (Paul Castle) | Recommend that Virginia regulations provide for an alternative procedure (decision matrix) which would allow for the evaluation of spillway design floods SDF less than the PMF where there would be no unreasonable or significant increase in hazard to life and property. The alternative procedure would allow for the use of non-structural measures to enhance public safety which would have a more immediate positive impact on public safety including but not limited to the design and construction standards of the impounding structure, condition of the impounding structure and its operation and maintenance history, cost of modification to the impounding structure, the completeness of the emergency action plan, and the ability to limit development in the inundation zone. | The proposed regulations do establish an incremental damage assessment criteria by which lesser spillway capacity designs may be considered where appropriate (4VAC50-20-52). This assessment would allow a reduction in required spillway design flood where such a reduction does not pose an additional threat to downstream life or property. Use of the assessment requires that operation and maintenance of the impounding structure be satisfactory and up-to-date, that emergency action plan requirements be satisfied, and that inspection reports be satisfactory and complete. The TAC considered the inclusion of an additional alternative procedure whereby dams would be permitted to build to lesser spillway design floods based on public education efforts and other non-structural components, but rejected such an approach on the basis that it did not provide the same level of safety assurance as the incremental approach that is proposed. |
| Lake of the Woods Association, Inc. (Neil Buttimer); Lake Barcroft Watershed Improvement District (Davis F. Grant) | Terms such as “possible”, “probable”, “excessive”, “appreciable”, without adequate clarification, result in inconsistent and inexact exercise of judgment. | While the proposed regulations do recognize that some level of professional judgment must be exercised in making determinations related to dams, the proposed regulations, in 4VAC50-20-20, require that all engineering analyses, including plans, specifications, hydrology, hydraulics and inspections bear the seal of a licensed professional engineer. |
| Phil Winter;<br>Ellen Winter;<br>Town of Purcellville (Karin Fellers);<br>Nancy Gravely; John Hakola; | Regulations concerning structural soundness and safety should apply to all dams, with no exceptions for agricultural impounding | The proposed regulations do apply to all dams, both existing and new, that fall under the authority of the Dam Safety Act, § 10.1-604 et seq. of the Code of Virginia. Among the dams that are exempt from the requirements of the Act are dams operated |

| | | |
|---|---|---|
| Karen Hakola; Reston Association (Milton W. Matthews and Larry T. Butler); James Marshall; Ernest Meier; Martin Graves | structures | primarily for agricultural purposes that are less than 25 feet in height or which create a maximum impoundment capacity of less than 100 acre feet (see the definition of "impounding structure" contained in § 10.1-604 of the Code of Virginia). Subjecting these dams to regulation would require an act of the General Assembly; the Board does not have the authority to set regulatory criteria for such dams. |
| Phil Winter, Ellen Winter; Augusta County Service (William A. Monroe); Forest Lakes Property Owners Association (Craig Szczutkowski and Sharon Sitterley); Mike Lubosch | Regulations should more equitably balance the responsibilities of existing impoundment structure owners with those who promote development of, or decide to erect buildings or reside in, inundation zones. | It is understood that dam owners are often required to upgrade their dams due to downstream development over which they have no control. Creating equity among dam owners and downstream property owners, however, would require additional authority from the General Assembly; the Board does not have the authority under existing law to impose requirements that would be necessary to such a process. The TAC requested the Department to consider legislation on this issue in the future. |
| Phil Winter, Ellen Winter; Forest Lakes Property Owners Association (Craig Szczutkowski and Sharon Sitterley) | Local authorities should identify inundation zones to potentially affected public. | While localities currently have the authority to map dam break inundation zones pursuant to § 10.1-606.1 of the Code of Virginia, it would require an act of the General Assembly to change this permission to a mandate. In the interest of increased public awareness, however, the proposed regulations do require that the owner of an impounding structure provide the local government with a copy of a dam break inundation zone map showing the area that could be affected by a breach (4VAC50-20-58). |
| Phil Winter, Ellen Winter; James Marshall | In Table 1, the relationship between spillway design requirements and the potential public safety risks should be maintained. | The revised Table 1 that appears in 4VAC50-20-50 of the proposed regulations does maintain the relationship between spillway design requirements and potential public safety risks as it was in the existing Table 1. Ensuring adequate public safety has led to the adjustment of some required spillway design floods. |
| Phil Winter, Ellen Winter; James Marshall | If fees must be charged by the State, the fee should vary with the complexity of, and hours spent by the State on the inspection and certification process. | The fees included in Part VI of the proposed regulations vary according to the hazard potential of the dam and, in some cases, according to the length of time that the permit or certificate applied for will be valid. It is believed that the hazard potential of the dam is related to the complexity of the review and certificate process. |
| Phil Winter, Ellen Winter | Minimal fees, if any, should apply to periodic inspections of sound dams with negligible potential impact on public safety or building structures. | The proposed regulations do not establish a fee for the inspection of dams. The prices of inspections conducted by private licensed professional engineers, where required, is beyond the regulatory authority of the Board. |

| | | |
|---|---|---|
| Phil Winter, Ellen Winter; Lake Marian Property Owners' Association (Timothy M. Biddle); Mr. and Mrs. Charles Taylor; Peter J. Williams; Gary Sjordal; Louis O. Goodwin; John Hakola; Karen Hakola; Homeowners Association (Rodger Reynolds); Lake Barcroft Watershed Improvement District (Davis F. Grant); Augusta County Service Authority (William A. Monroe); Forest Lakes Property Owners Association (Craig Szczutkowski and Sharon Sitterley); Doug Crain | Differences in construction standards for new and existing dams should be allowed. Treating new and existing dams alike, in terms of construction standards, places an inequitable burden on owners of existing dams. It is less of a financial burden on builders and owners of new dams to adhere to more strict safety standards than it is for owners of existing dams to improve their structures to meet new standards. | It is understood that construction costs for new dams are often less than those incurred in retrofitting an existing dam. As the regulatory TAC observed, however, dangers to the public are not dependent on whether a dam is new or pre-existing; and there is no substitute for the level of safety provided by the safe design and operation of a dam. Therefore, there is no defensible reason for treating new and existing dams differently. |
| Dr. Peter G. Rainey; Forest Lakes Property Owners Association (Craig Szczutkowski and Sharon Sitterley) | There is no reliable, consistent, and credible measure to the reduction of risk which would occur to a dam built to spillway design floods less than the probable maximum flood, by an arbitrary increase in the SDF to a full PMF. | Data shows that severe rainfall events approaching the PMF can and do occur. Virginia, as evidenced by a presentation made to the technical advisory committee, is in fact situated such that these events must be considered in ensuring the safe design, construction, and operation of impounding structures. To illustrate the point, two of the five most intense 12-hour storm events in recorded United States history occurred in Virginia (Nelson County in 1969 and Madison County in 1995). A third also occurred in the Mid-Atlantic region (Smethport, PA in 1942). |
| Lake Holiday (Chris Allison); Town of Purcellville (Karin Fellers); Culpeper Soil and Water Conservation District (Greg Wichelns); Augusta County Service (William A. Monroe) | Support defining "alteration" and enabling DCR to monitor and inspect alteration activities in a manner similar to construction activities; however, should not be defined so broadly that minor modifications would be the subject of such inspections. | A definition of the term "alteration" has been added to the proposed regulations; this definition is taken verbatim from § 10.1-604 of the Code of Virginia. By its own terms, this definition applies to activities that could alter or affect the structural integrity of an impounding structure; it would not include normal maintenance or other minor activities. DCR does have the authority to inspect alteration activities pursuant to § 10.1-610.1 of the Code of Virginia; this authority is also noted in the proposed regulations in 4VAC50-20-180. |
| Lake Holiday (Chris Allison); Reston Association (Milton W. Matthews and Larry T. Butler); Culpeper Soil and Water Conservation District (Greg Wichelns); Forest Lakes Property Owners Association (Craig Szczutkowski and Sharon Sitterley) | Support requiring impounding structure owners to have an up to date emergency action plan. | The proposed regulations require impounding structure owners to have an up to date emergency action plan or, for low hazard dams, emergency preparedness plan. The requirements for these plans are contained in 4VAC50-20-175 and 4VAC50-20-177. |
| Lake Holiday (Chris Allison); | Table 1 should be modified to | Table 1, which is found in 4VAC50-20-50 of the |

| | | |
|---|---|---|
| Town of Purcellville (Karin Fellers); Headwaters Soil and Water Conservation District (Richard M. Shiflet); John Hakola; Karen Hakola | improve the applicability of its information and increase consistency in its use. | proposed regulations, has been amended in accordance with discussions had by a 28 member technical advisory committee over a nearly six month period. |
| Lake Holiday (Chris Allison); Forest Lakes Property Owners Association (Craig Szczutkowski and Sharon Sitterley) | Oppose establishing permit application fees for the administration of the Dam Safety Program that would increase the costs to owners statewide. | Section 10.1-613.5 of the Code of Virginia authorizes the Board to establish and collect permit application fees for use in administering the Dam Safety Program, review of permit and certificate applications and, finally, for use in the repair and maintenance of dams. While the Board has established fees in the proposed regulations, it has attempted to address the needs noted above in a way that has as little impact on dam owners as possible. These fees will be the program's sole source of funding aside from funds appropriated by the General Assembly. |
| Lake Holiday (Chris Allison); Town of Purcellville (Karin Fellers) | Support removing the forms from the regulations. | The forms have been removed from the proposed regulations. The substantive requirements of the forms have been incorporated into the text of the regulations as appropriate. |
| Lake Holiday (Chris Allison); Scott Cahill; Town of Purcellville (Karin Fellers); Headwaters Soil and Water Conservation District (Richard M. Shiflet); John Hakola; Karen Hakola; Culpeper Soil and Water Conservation District (Greg Wichelns); Augusta County Service (William A. Monroe) | Support clarifying the meaning of terms such as "significantly", "appropriate", "reasonable", "probable" and "possible". Would like to see the regulations contain as little ambiguity as possible. | The proposed regulations have been developed with the assistance of a 28 member technical advisory committee over a nearly six month period. Clarification of terms existing in the regulations has been attempted to the extent deemed advisable in consultation with the TAC; however, it is recognized that determinations regarding dams will at times include the exercise of professional judgment. To ensure the reliability of this judgment, 4VAC50-20-20 requires that all engineering analyses, including plans, specifications, hydrology, hydraulics and inspections, bear the seal of a licensed professional engineer. |
| John A. Barnes; Daniel Osborne; Homeowners Association (Rodger Reynolds); Forest Lakes Property Owners Association (Craig Szczutkowski and Sharon Sitterley); Doug Crain | Grandfather existing dams from any modifications to meet the new criteria unless they pose an unacceptable risk. | The proposed regulations, in 4VAC50-20-125, include a delayed effective date for existing dams that have a current Regular Operation and Maintenance Certificate that will allow an additional period for the commencement of spillway upgrades necessitated by the adoption of the proposed regulations. For other necessary alterations, however, as the regulatory TAC observed, dangers to the public are not dependent on whether a dam is new or pre-existing; and there is no substitute for the level of safety provided by the safe design and operation of a dam. Therefore, there is no defensible reason for treating existing dams posing safety risks differently from new dams. |
| John A. Barnes; Buckingham | Provide complete funding for | The provision of funding for dam repairs is beyond |

| | | |
|---|---|---|
| County (Robert Luke) | design and construction of modifications to existing dams. | the authority of the Board in this regulatory action, which is being undertaken pursuant to the Dam Safety Act, § 10.1-604 et seq. of the Code of Virginia. A separate program under the Flood Prevention and Protection Assistance Fund, § 10.1-603.16 et seq. of the Code of Virginia, may provide funding for dam repairs in some respects in the future. |
| Watershed Services, Inc. (Scott Cahill; Austen Bander) | Regulations must be made more strict. | The proposed regulations are based on what is believed necessary to ensure the safe design, construction, alteration, maintenance, and operation of dams in the Commonwealth of Virginia. The criteria contained in these regulations were drafted with the assistance of a 28 member technical advisory committee, which met over a nearly six month period. Existing regulatory provisions have been amended as determined appropriate. |
| Watershed Services, Inc. (Scott P. Cahill, Lisa A. Cahill, Cameron J. Smith, and Austen C. Bander); Reston Association (Milton W. Matthews and Larry T. Butler); Charles W. Wilson, Jr.; Kay E. Wilson; Jim Hopkins; John Bailey | Public safety must be the primary concern of the regulations. | Public safety is the primary concern of the proposed regulations pursuant to the Board's mandate under § 10.1-605 of the Code of Virginia. The Board's policy of protecting public safety is noted in the regulations, both existing and proposed, in 4VAC50-20-20(A). |
| Watershed Services, Inc. (Scott P. Cahill, Lisa A. Cahill, Cameron J. Smith, and Austen C. Bander) | Dam classification system should be changed to be aligned with the national system of high, significant, and low hazard dams. The national system is more intuitive and easily understood without reference materials. | The classification system employed by Table 1 in 4VAC50-20-50 has been amended to contain high, significant, and low hazard classifications. |
| Watershed Services, Inc. (Scott P. Cahill, Lisa A. Cahill, Cameron J. Smith, and Austen C. Bander) | Increased educational activities, for owners of impounding structures, homeowners in inundation areas, localities, and the general public should be required. | The emergency action plan requirements for High and Significant Hazard Potential dams found in 4VAC50-20-175 of the proposed regulations require owners of high and significant hazard potential dams to conduct an annual drill that tests, develops, and maintains skills in emergency response procedures. This drill will also include a face-to-face meeting with local officials to the extent practicable. Secondly, these dam owners are required to conduct a table top exercise with state and local emergency management officials once every three years. Additionally, 4VAC50-20-177 requires owners of low hazard potential dams to develop procedures for emergency response and to familiarize themselves with steps to be taken in response to emergency situations. Finally, other provisions of the proposed regulations encourage increased public awareness of dams and their |

| | | |
|---|---|---|
| | | inundation zones, including 4VAC50-20-58, which requires that the owner of an impounding structure provide the local government with a copy of a dam break inundation zone map showing the area that could be affected by a breach. |
| Watershed Services, Inc. (Scott P. Cahill, Lisa A. Cahill, Cameron J. Smith, and Austen C. Bander) | A special license should be required for contractors who work on dams. | The proposed regulations do not require special licensing for contractors who work on dams. All construction or alteration activities, however, must be conducted under the supervision of a licensed professional engineer (4VAC50-20-180(B)). |
| Town of Purcellville (Kim Fellers);<br>Lake of the Woods Association, Inc. (John S. Bailey) | Essential that the Virginia program be consistent with the federal program; including the emergency action plan requirements. | The proposed regulations require impounding structure owners to have an up to date emergency action plan. The requirements for these plans are contained in 4VAC50-20-175 and 4VAC50-20-177. Many of these requirements are similar to those of Federal Emergency Management Agency (FEMA). Additionally, the hazard classification system employed by Table 1 in 4VAC50-20-50 has been amended and is similar to that utilized by FEMA. |
| Duncan C. McGregor; Hidden Valley Landowners' Association (John Kern); John Taylor | Table 1 should maintain its flexibility and requirements that a broad range of factors be considered. | While Table 1, which is found in 4VAC50-20-50, has been amended in the proposed regulations, the considerations relevant to hazard potential classification have remained flexible while being focused on public safety. |
| Duncan C. McGregor; City of Norton (E. W. Ward);<br>Culpeper Soil and Water Conservation District (Greg Wichelns); Lake Front Royal Property Owners Association (Paul Castle); Jean Quill; Mike Lubosch | Dam owners are more often than not overwhelmed by regulatory demands and engineering requirements. They also have limited resources, particularly finances. | It is understood that dam owners often have limited resources and that they can, at times, find regulatory demands overwhelming. The proposed regulations have been drafted with the intent of keeping regulatory impact on dam owners to the minimum necessary to protect public safety. |
| Nancy Gravely; Lake of the Woods, Inc. (John S. Bailey) | Include some measures that allow County Planning and Zoning Offices to limit construction in downstream inundation areas. | Localities presently have the authority to regulate or limit future development in a dam break inundation zone pursuant to Code of Virginia § 10.1-606.1. Any modification of this authority would be beyond the authority of the Board in these regulations and would require an act of the General Assembly. |
| Lake of the Woods, Inc. (John S. Bailey) | Mapping of inundation zones should be required. The maps should identify all structures within an inundation zone and be filed with local planning and zoning office. | The proposed regulations require dam break inundation zone mapping in 4VAC50-20-54. These maps are required to be delivered to the local government with planning and zoning responsibilities by 4VAC50-20-58. |
| Headwaters Soil and Water Conservation District (Richard M. Shiflet) | While recognizing the expense of bringing older structures up to the standards of increasing safety regulations, great caution and much review must | While Table 1 of 4VAC50-20-50 has been amended in the proposed regulations, the PMF spillway design requirement for high hazard potential dams, as well as for large significant hazard potential dams, has been retained. |

| | | |
|---|---|---|
| | be considered before lowering standards for spillway design floods to criteria less than the present "probable maximum flood". | |
| Headwaters Soil and Water Conservation District (Richard M. Shiflet) | Supports the exemption of Soil and Water Conservation Districts from any proposed permit fees. | Soil and Water Conservation Districts are exempt from fees pursuant to § 10.1-613.5 of the Code of Virginia; this exemption is noted in the proposed regulations in 4VAC50-20-360. |
| Headwaters Soil and Water Conservation District (Richard M. Shiflet) | Would welcome the opportunity to test each emergency action plan, but without increased funding and staffing support it will be impossible to carry out "in-the-field" planned exercises. | It is understood that lack of staffing and funding can at times hamper efforts to carry out increased planning activities. Exercises anticipated by the emergency action plan requirements of the proposed regulations (contained in 4VAC50-20-175 and 4VAC50-20-177), such as drills and tabletop exercises, have been designed to allow for an effective emergency planning process to maximize public safety benefits at a minimal cost to the dam owner. |
| John Hakola; Karen Hakola | Funding sources for owners to get low interest loans should be provided. | The provision of funding for dam repairs is beyond the authority of the Board in this regulatory action, which is being undertaken pursuant to the Dam Safety Act, Code of Virginia § 10.1-604 et seq. A separate program under the Dam Safety, Flood Prevention and Protection Assistance Fund, § 10.1-603.16 et seq. of the Code of Virginia, may assist with funding for dam repairs in the future. |
| Fairfax County (Donald R. Demetrius) | Great care must be taken in deciding which procedure should be used to evaluate the spillway design flood for existing dams. | It is agreed that great care needs to be taken in determining which procedure to use in evaluating spillway design floods. The proposed regulations represent the result of nearly six months of meetings between 28 members of the technical advisory committee. Spillway design floods were a major topic of discussion during the drafting process, and the proposed regulations represent agreement among the TAC to the extent possible. |
| Hidden Valley Landowners' Association (John Kern) | Retain the notes regarding the need for competent, experienced engineering judgment | The proposed regulations, in 4VAC50-20-20(E), requires that design, inspection and maintenance of impounding structures be conducted utilizing competent, experienced engineering judgment that takes into consideration factors including but not limited to local topography and meteorological conditions. |
| Anderson and Associates, Inc. (David B. DeHoff); Augusta County Service (William A. Monroe) | Sources referenced in 4 VAC 50-20-320 are too general and contradict one another. | The sources referenced in 4VAC50-20-320 have been reviewed in consultation with a 28 member technical advisory committee that met over a nearly six month period. This review led to the inclusion of additional sources in the proposed regulations, and to a statement of clarification that specifies that approaches from multiple sources may not be |

| | | |
|---|---|---|
| | | utilized on a single project. |
| Howard Potter | Dams are an important part to our history. | It is recognized that dams have an important place in the history of the Commonwealth of Virginia. Ensuring that dams are designed, constructed, altered, operated, and maintained in a way that protects public safety helps ensure that they will likewise be an important part of Virginia's future. |
| Augusta County Service (William A. Monroe) | Maintain the forms as part of the regulations. | The forms have been removed from the proposed regulations to enable easier updating and amendment in the future. The substantive requirements of the forms, however, have been incorporated into the text of the proposed regulations as appropriate. |
| Jim Hopkins | Dam engineers are in agreement on how to compute PMF but often use different assumptions in their projections. These differences tend to decrease the credibility and reliability of the results. When computing the PMF, several different methods should be applied. | The proposed regulations, in 4VAC50-20-50(D), require that a PMF projection be derived from the current probable maximum precipitation available from the National Weather Service, and that PMF hydrographs for 6, 12, and 24 hour durations be established. The hydrograph that creates the largest peak outflow is to be used to determine capacity for non-failure and failure analyses. Present and planned land use conditions must be considered in determining the runoff characteristics of the drainage area. |
| Fairfax County (Donald Demetrius) | Definition of dam height is confusing. | "Height" is a term defined in § 10.1-604 of the Code of Virginia; any substantive change to the definition would require an act of the General Assembly. While not altering the substance of this Code definition, the proposed regulation has attempted to clarify the definition in 4VAC50-20-30 by specifying that "height" means the hydraulic height of the impounding structure. |
| Hughes Swain | We have to try and prepare for how terribly devastating a hard rainstorm can be and I'm sure that we'll come up with a more satisfactory way to do it. | It is recognized that devastating rainstorm events can and do occur. Virginia, as evidenced by a presentation made to the technical advisory committee, is in fact situated such that these events must be considered in ensuring the safe design, construction, and operation of impounding structures. To illustrate the point, two of the five most intense 12-hour storm events in recorded United States history occurred in Virginia (Nelson County in 1969 and Madison County in 1995). A third also occurred in the Mid-Atlantic region (Smethport, PA in 1942). The proposed regulations have been developed to the end of protecting public safety from such events, and were drafted with the assistance of a 28 member technical advisory committee that met over a nearly six month period. |
| Watershed Services, Inc. (Lisa Cahill) | Construction can be a little bit disruptive. The risk that | It is understood that construction and alteration activities conducted on dams can be disruptive at |

| | | |
|---|---|---|
| | occurs to a dam during the time of construction is actually pretty minimal, especially if its done in accordance with reasonable construction practices. | times. Still, these disruptions are temporary in nature, and in most cases limited to the area of the dam itself. These temporary inconveniences pale in comparison to the devastation that can result from the failure of a dam.<br>To ensure that any risks associated with alteration or construction are kept to a minimum, the proposed regulations require that any alteration or construction of a dam be conducted pursuant to an alteration or construction permit issued by the Board (4VAC50-20-60). All alteration or construction permit applications must be accompanied by a design report prepared by a licensed professional engineer which includes plans and specifications that demonstrate that the dam will be stable during all phases of construction (4VAC50-20-70(B)(14) and 4VAC50-20-80(13)). In addition, the proposed regulations require inspections, monitoring, and testing during alteration or construction to ensure the safety of the dam (4VAC50-20-180(B)). |
| Martin Graves | All dam structures should be under the responsibility of the Commonwealth of Virginia. | While some impounding structures are the property of the Commonwealth of Virginia, many others are located on private property. The Commonwealth cannot assume responsibility for structures that it does not own, operate, or maintain. |

## Family impact

*Please assess the impact of the proposed regulatory action on the institution of the family and family stability including to what extent the regulatory action will: 1) strengthen or erode the authority and rights of parents in the education, nurturing, and supervision of their children; 2) encourage or discourage economic self-sufficiency, self-pride, and the assumption of responsibility for oneself, one's spouse, and one's children and/or elderly parents; 3) strengthen or erode the marital commitment; and 4) increase or decrease disposable family income.*

It is not anticipated that this regulation will have a direct impact on the institution of the family or family stability. However, the improvements to the regulations will result in more properly maintained and operated impounding structures that will have safety benefits for families living downstream.

## Detail of changes

*Please detail all changes that are being proposed and the consequences of the proposed changes. Detail all new provisions and/or all changes to existing sections.*

*If the proposed regulation is intended to replace an emergency regulation, please list separately (1) all changes between the pre-emergency regulation and the proposed regulation, and (2) only changes made since the publication of the emergency regulation.*

| Current section number | Proposed new section number, if applicable | Current requirement | Proposed change and rationale |
|---|---|---|---|
| 4 VAC 50-20-20 | | Presently, the only requirement concerning engineering analysis is that it be conducted by and bear the seal of a professional engineer licensed to practice in Virginia. | In addition to the current requirements, the proposed regulations require any engineering analysis to take into account any unique, specific local characteristics at the impounding structure site, including but not limited to local topography and meteorological conditions. This change is clarifying in nature and reflects current program administration. |
| 4 VAC 50-20-30 | | Currently, there are no definitions for the terms "agricultural purpose", "alteration", "construction", "dam break inundation zone", "department", "emergency action plan or EAP", "emergency action plan exercise", "emergency preparedness plan", "spillway", "stage I condition", "stage II condition", "stage III condition", "sunny day dam failure", and "tabletop exercise"<br><br>There are definitions for "acre-foot", "agricultural purpose dam", "alteration permit", "drill", "freeboard", "height", "impounding structure", "inundation zone", "maximum impounding capacity", "normal impounding capacity", "owner", and "watercourse". | The proposed regulations provide definitions or modifications to definitions for "acre-foot", "agricultural purpose", "agricultural purpose dam", "alteration", "construction", "dam break inundation zone", "department", "drill", "emergency action plan or EAP", "emergency action plan exercise", "emergency preparedness plan", "freeboard", "height", "impounding structure", "maximum impounding capacity", "normal impounding capacity", "owner"' "spillway", "stage I condition", "stage II condition", "stage III condition", "sunny day dam failure", "tabletop exercise" and "watercourse". These modifications and additions were made to improve clarity, adapt terminology to engineering trade usage, and to bring the regulations into conformance with changes made to the Code of Virginia since the time of the adoption of the current regulations. Key changes included:<br>a) The term "agricultural purpose" is defined as the production of an agricultural commodity that requires the use of impounded waters.<br>b)The term "agricultural purpose dam" is modified to remove the requirement that the dam owner certify its status as agricultural, as it is believed that such a requirement may exceed the authority of the Board under the Dam Safety Act (§ 10.1-604 et seq. of the Code of Virginia). It was further modified to remove the words "constructed" and "maintained" in order to comport with changes made to the Dam Safety Act during the 2006 General Assembly.<br>c) The term "alteration" is defined as set forth in the Dam Safety Act, § 10.1-604 et seq. of the Code of Virginia.<br>d) The definition of the term "alteration permit" is modified to mean "a permit required for any alteration to an impounding structure". The substance of the current definition of this term is included in the new definition of "alteration". |

| | | | |
|---|---|---|---|
| | | | e) The term "construction" is defined as set forth in the Dam Safety Act, § 10.1-604 of the Code of Virginia.<br>f) The term "dam break inundation zone" is defined as set forth in the Dam Safety Act, § 10.1-604 of the Code of Virginia. This definition supersedes the definition of "inundation zone" contained in the current regulations; that term is removed from the proposed regulations.<br>g) The term "Department" is defined to clarify its meaning when used in later sections of the proposed regulations. The Department of Conservation and Recreation administers the Commonwealth's Dam Safety program pursuant to the Dam Safety Act and a delegation from the Board.<br>h) The term "drill" is defined as a type of emergency action plan exercise that tests, develops, or maintains skills in an emergency response procedure (a full definition is found in the proposed regulations). This term is used in later sections of the proposed regulations dealing with the development and maintenance of an emergency action plan.<br>i) "Emergency Action Plan or EAP" is defined to refer to a formal document that recognizes potential emergency conditions and specifies preplanned actions to be followed to minimize loss of life and property damage (a complete definition is found in the proposed regulations). Definition of this term is necessary for clarification and application to new section 4VAC50-20-175.<br>j) "Emergency Action Plan Exercise" is defined as an activity designed to promote emergency preparedness; test or evaluate emergency action plans, procedures, or facilities; train personnel in emergency management duties; and demonstrate operational capability (a complete definition is found in the proposed regulations). Definition of this term is necessary for clarification and application to new section 4VAC50-20-175.<br>k) "Emergency Preparedness Plan" is defined as a formal document prepared for Low Hazard dams that provides maps and procedures for notifying owners of downstream property that may be impacted by an emergency situation at an impounding structure. Definition of this term is necessary for clarification and application to new section 4VAC50-20-177.<br>l) "Freeboard" retains the definition of the term "design freeboard" used in the current regulations. The removal of the word "design" from the term is simply for clarification purposes.<br>m) The definition of "height" was modified to clarify that the term refers to the hydraulic height |

| | | | |
|---|---|---|---|
| | | | of an impounding structure. Use of the term "hydraulic" rather than "structural" comports with trade usage of the term "height"; it is believed that this change does not substantively affect the meaning of the term.<br>n) The definition of "impounding structure" was modified to comport with the definition of that term contained in the Dam Safety Act, § 10.1-604 of the Code of Virginia.<br>o) "Spillway" is defined as a structure to provide for the controlled release of flows from the impounding structure to a downstream area. This definition comports with current understanding of the term and was inserted for clarification purposes.<br>p) "Stage I Condition", "Stage II Condition", and "State III Condition" are defined to refer to various potential or actual flood events at the site of an impounding structure; definition of these terms is necessary for clarification and application to 4VAC50-20-177.<br>q) "Sunny Day Dam Failure" is defined as the breaching of an impounding structure during normal conditions (a complete definition is found in the proposed regulations). This definition is based on current understandings and is included for clarification purposes.<br>r) "Tabletop Exercise" is defined as a type of emergency action plan exercise (a complete definition is found in the proposed regulations). Definition of this term is necessary for clarification and application to 4VAC50-20-175. |
| 4 VAC 50-20-40 | | Currently, impounding structures are classified in 1 of 4 categories according to size and hazard potential. The categories are Class I, Class II, Class III, and Class IV.<br><br>There is currently no specific requirement that possible damages to agricultural interests be considered in determining an impounding structure's appropriate hazard categories.<br><br>There is currently no set requirement for a dam break analysis to be conducted by the owner's engineer to support the hazard potential categories determination.<br><br>Currently, current and | The proposed regulations contain the following amendments and additions:<br>a) The impounding structure hazard potential classifications are changed from 4 classifications to 3 classifications. This more closely tracks the classification systems utilized by most other states and the federal government.<br>b) Definitions of the 3 hazard classifications were refined from the existing 4 definitions in order to provide clarity and to provide additional public safety assurances.<br>c) Damage to agricultural interests is now included in the list of potential economic damages that must be considered in determining an impounding structure's hazard classification, as such interests are personal property.<br>d) A dam break analysis is now required to support the hazard classification proposed by the owner's engineer. This will greatly enhance the reliability of the engineer's proposal and the Board's final determination, thus enhancing public safety.<br>e) To clarify what types of development must be |

| | | | |
|---|---|---|---|
| | | projected downstream development must be considered in determining an impounding structure's hazard potential category. | considered in assigning hazard classification, the proposed hazard classification must also take into account present and planned land use in the dam break inundation zone rather than projected development, which may ultimately not occur. |
| 4 VAC 50-20-50 | | Table 1 is used for impounding structures being constructed; as written, it does not specifically apply to existing impounding structures, although Board practice has been to utilize these standards in evaluating an existing impounding structure.<br><br>There are 4 hazard potential categories utilized in Table 1. These categories are described by abridged definitions. All the classes are further defined by the size and maximum impounding capacity of the impounding structure. There are ranges for the spillway design flood under all classes of impounding structures.<br><br>There is no mention of the ability to use incremental damage assessment to reduce the established spillway design flood. In 4 VAC 50-20-130, incremental damage assessment is available to existing impounding structures only. | The proposed regulations contain the following amendments and additions:<br>a) It is specified that Table 1 is applicable to all impounding structures regardless of the year of construction. This aligns the regulations with the practices currently employed by the Board in reviewing the hazard class of an existing impounding structure. Further, as was observed by the technical advisory committee, public safety is dependent upon the presence of an impounding structure and its inundation zone, and not upon the date of the impounding structure's construction. Therefore, there is little defensible basis for treating new and old impounding structures differently.<br>b) Table 1 itself is revised to reflect the revised impounding structure hazard potential classifications relayed above. Additionally, ranges in spillway design floods that result in inconsistency in application were removed and a uniform standard adopted. Thirdly, as all high hazard impounding structures are likely to cause loss of life irrespective of their size, Table 1 was revised to require the spillway of all high hazard potential structures to be engineered to pass the full probable maximum flood (PMF). Finally, a minimum threshold for the incremental analysis provided for in 4VAC50-20-52 was inserted. These thresholds recognize that in order to compensate for incomplete understandings and to ensure public safety, each impounding structure must be built to a base minimum standard.<br>c) Table 1 clarifies that the appropriate size category is determined by the largest size associated with the maximum impounding capacity and height of the impounding structure.<br>d) Table 1 stipulates that reductions to the established spillway design flood may be evaluated for all impounding structures using incremental damage assessment.<br>e) Table 1 stipulates that any deviation in the application of established developmental procedures for the PMF must be explained and justified by the owner's engineer.<br>f) Table 1 requires that the owner's engineer develop PMF hydrographs for 6, 12, and 24 hour durations. The hydrograph that creates the largest peak flow is to be used to determine capacity for non-failure and failure analysis. |

| | | | |
|---|---|---|---|
| | 4 VAC 50-20-52 | The current regulations (4VAC50-20-130) authorize the use of incremental damage analysis on only those impounding structures constructed before July 1982. This analysis is also available only to impounding structures that meet certain conditions. There is currently no minimum threshold for a reduction if one is available. | The proposed regulations:<br>a) Create a new section that allows for the potential reduction of the spillway design flood requirement through an incremental damage assessment. This is now applicable to all impounding structures.<br>b) Retain and clarify certain conditions that must be adequately addressed before proceeding with an incremental damage assessment including: (1) satisfactory operation and maintenance; (2) there is no other alteration needed related to the integrity of the structure; (3) emergency action plan or emergency preparedness requirements have been satisfied; (4) inspection report requirements have been met; (5) applicant demonstrates that the impounding structure does not pose an unreasonable hazard to life and property; (6) owner satisfies all special requirements imposed by the Board<br>c) Specify that in no situation shall the allowable spillway capacity reduction be less than the level at which the incremental increase in water surface elevation downstream due to the failure of an impounding structure is no longer considered to present an unacceptable additional downstream threat.<br>d) Establish that water depths greater than two feet and overbank flow velocities greater than three feet per second shall be used to define conditions for unacceptable additional downstream threat to persons or property.<br>e) Specify that the spillway design flood shall not be reduced below the minimum threshold values as determined by Table 1. |
| | 4 VAC 50-20-54 | The current regulations contain no requirement for the mapping of dam break inundation zones, although some dam owners currently include such maps in their emergency action plans and many others have compiled the data necessary to construct a map. Currently, 4VAC50-20-70 requires the identification of properties located downstream of an impounding structure as part of an application for a construction permit; 4VAC50-20-120 requires that applicants for an operation and maintenance certificate for an existing impounding structure prepare an emergency action | The proposed regulations:<br>a) Create a new section that sets out dam break inundation zone mapping requirements.<br>b) Specify that the location of the end of the inundation mapping should be where the water surface elevation of the dam break inundation zone and the water surface elevation of the spillway design flood during a non-dam failure event converge to within one foot of each other. This would demonstrate a level where a failure of the impounding structure does not constitute an additional hazard to downstream life or property.<br>c) Specify that all inundation zone map(s), except those utilized in meeting the requirements of emergency preparedness for low hazard potential shall be signed and sealed by a licensed professional engineer to ensure reliability.<br>d) For determining hazard potential classification, establish that the following shall be provided: sunny-day break analysis, a dam break analysis utilizing a probable maximum flood with a |

| | | | |
|---|---|---|---|
| | | plan which describes downstream individuals who will be affected by the failure of the impounding structure and includes methods for contacting them. | structure failure; and a dam break analysis utilizing a probable maximum flood without a structure failure.<br>e) Tie the mapping requirements to the emergency action plan requirements. |
| | 4 VAC 50-20-58 | Currently, while there is no requirement that the owner notify a local government of the issuance of an operation and maintenance certificate, 4VAC50-20-60(C) specifies that when the Board receives an application for a permit to construct or alter an impounding structure, the Director is required to inform the government of any jurisdiction that might be affected by the permit application. There is no requirement for further notification by either the Director, the Board, or the Owner upon the issuance of a permit or certificate. | In this new section, the proposed regulations specify that for each certificate issued, the impounding structure owner shall send a copy of the certificate to the appropriate local government(s) with planning and zoning responsibilities. |
| 4 VAC 50-20-60 | | The current regulations prohibit the construction or alteration of an impounding structure in a way that could impact its structural integrity without a permit. | While retaining the requirement that a person wishing to construct an impounding structure obtain a construction permit, the proposed regulations additionally:<br>a) Clarify that if an owner or the owner's engineer has determined that circumstances are impacting the integrity of the impounding structure which could result in the imminent failure of the impounding structure, temporary repairs may be initiated prior to approval from the Board. The owner shall notify the Department within 24 hours of identifying the circumstances impacting the integrity of the impounding structure. This clarification was provided in response to numerous dam owner concerns that they did not feel the regulations permitted them from acting to prevent a dam failure in an emergency.<br>b) Specify that such emergency notification shall not relieve the owner of the need to obtain an alteration permit as soon as may be practicable, nor shall the owner take action beyond that necessary to address the emergency situation.<br>c) Require that the owner notify local governments that may be affected by an impounding structure of any application for a construction or alteration permit at the time that the permit application is submitted. |

| | | | |
|---|---|---|---|
| 4 VAC 50-20-70 | | The current regulations contain requirements for construction permits. Potential applicants are encouraged to submit a project concept prior to the development of a full design report. Requirements for the composition of a full design report are also included, as are plan of construction requirements. Subsection K of 4VAC50-20-70 also provides that the Director's authorization to fill upon completion of construction constitutes a temporary operation and maintenance certificate until Board approval. | The proposed regulations:<br>a) Incorporate authorities provide in the Code during the 2006 Session.<br>b) Establish preliminary design report requirements for owners wishing to submit a preliminary design to DCR Dam Safety for consideration prior to developing a full design report for review and approval.<br>c) Clarify and supplement design report requirements in order to simplify the process for applicants and obtain information necessary to make a full determination regarding the safety of a potential impounding structure construction project.<br>d) Clarify and supplement plan of construction requirements, including the requirements for a construction sequence with milestones, an E&S plan (if applicable), a Stormwater Management Plan (if applicable), and a temporary Emergency Action Plan.<br>e) Articulate that the Board, the Director, or both may take any necessary action consistent with the Dam Safety Act (§10.1-604 et seq. of the Code of Virginia) if any terms of this section or of the permit are violated, if the activities of the owner are not in accordance with the approved plans and specifications, if construction is conducted in a manner hazardous to downstream life or property, or for other cause as described in the Act.<br>f) Specify that within 90 days after completion of the construction of an impounding structure, the owner shall submit: a complete set of record drawings signed and sealed by a licensed professional engineer and signed by the owner; a complete record report signed and sealed by a licensed professional engineer and signed by the owner; certification from the licensed professional engineer who has monitored construction of the impounding structure during construction that, to the best of the engineer's 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; an operation and maintenance certificate application; and an emergency action plan or emergency preparedness plan.<br>g) Specify that upon completion of construction, the impoundment may be filled upon Board issuance of an Operation and Maintenance Certificate. The provision related to the Director's approval to fill constituting a temporary operation and maintenance certificate was removed due to that provision exceeding the Director's authority under § 10.1-605.1 of the Dam Safety Act. |

| | | | |
|---|---|---|---|
| 4 VAC 50-20-80 | | The current regulations contain requirements for alteration permits but lack specificity with regard to the submissions required for a permit application, the terms of an issued permit, or enforcement mechanisms available in the event that permit terms are not followed. In fact, the only specific requirements required by the regulations is contained in a form that is incorporated by reference. In addition, the current regulations fail to address new provisions of the Dam Safety Act (§ 10.1-604 et seq. of the Code of Virginia) following the 2006 General Assembly. | To provide greater clarity and specificity for the regulated community with regard to necessary components of an application for an alteration permit, the terms of an issued permit, and new processes brought into existence through General Assembly action, the proposed regulations:<br>a) Incorporate authorities provide in the Code during the 2006 Session.<br>b) Establish design report requirements.<br>c) Establish plan of construction requirements including the requirements for a construction sequence with milestones and an E&S plan.<br>d) Specify that within 120 days of receipt of a complete alteration permit application the Board shall act on the application. Such application shall include any necessary interim provisions to the current Emergency Action Plan or Emergency Preparedness Plan.<br>e) Specify that the work identified in the Alteration Permit must commence within the time frame identified in the Alteration Permit.<br>f) Articulate that the Board, the Director, or both may take any necessary action consistent with the Dam Safety Act (§10.1-604 et seq. of the Code of Virginia) if any terms of this section or of the permit are violated, if the activities of the owner are not in accordance with the approved plans and specifications, if construction is conducted in a manner hazardous to downstream life or property, or for other cause as described in the Act.<br>g) Specify that within 90 days after completion of the alteration of an impounding structure, the owner shall submit: a complete record report signed and sealed by a licensed professional engineer and signed by the owner; and certification from the licensed professional engineer who has monitored alteration of the impounding structure that, to the best of the engineer's judgment, knowledge and belief, the impounding structure and its appurtenances were altered in conformance with the plans, specifications, drawings and other requirements approved by the Board.<br>h) Incorporate base requirements of the present form into the regulations so that the form itself may be more easily updated to allow for greater use by the regulated community. |
| 4 VAC 50-20-90 | | The current regulations require that the Director of DCR be notified prior to the transfer of ownership of an impounding structure that is the holder of an alteration or construction permit. The specific | In order to provide for greater amendment capabilities, the transfer of ownership form has been removed from the regulations. The basic requirements of the form, which should not need continual updating, are incorporated into this section. |

| | | | |
|---|---|---|---|
| | | requirements for the information to be contained in the notification is set forth in a form incorporated into the regulations. Additionally, the new owner is required to certify that he is aware of the Board's permit requirements and that he will comply with the terms and conditions of any permits. | |
| 4 VAC 50-20-100 | | This section currently requires that each Class I, II, and III impounding structure have a regular operation and maintenance certificate. Certificates are valid for six years. Class IV impounding structures are not required to obtain an operation and maintenance certificate, but must file an inventory report every six years. The section also requires that impounding structure owners notify the Board immediately of any changes in land use downstream. | Repealed; incorporated into 4 VAC 50-20-105 |
| | 4 VAC 50-20-105 | The topics included in this new section are currently found in 4VAC50-20-100 and 4VAC50-20-120, discussed above and below. | The proposed regulations would create a new section on regular operation and maintenance certificates that incorporates requirements of the existing sections and that:<br>a) Specify that a regular (high, significant or low hazard potential) operation and maintenance certificate is required for an impounding structure. This is an amendment of the previous requirements of 4VAC50-20-100 to reflect the change in hazard class terminology embodied in 4VAC50-20-50.<br>b) Establish operation and maintenance certificate application requirements including the requirements for an inspection report and an emergency action plan or an emergency preparedness plan. Many of these application requirements are currently contained in the forms incorporated into the regulations by reference that are being removed for ease of future modification.<br>c) Specify that if the operation and maintenance certificate application submittal is found to be not complete, the Director shall inform the applicant within 30 days and shall explain what changes are required for an acceptable submission. Currently, the Director must inform the applicant within 60 days. |

| | | | |
|---|---|---|---|
| | | | d) Specify that inspections shall be performed on an impounding structure annually to ensure that safe conditions are maintained.<br>e) Specify that inspection reports signed and sealed by a licensed professional engineer shall be submitted to the Department in accordance with the following schedule: for a high hazard potential impounding structure, every two years; for a significant hazard potential impounding structure, every three years; and for a low hazard potential impounding structure, every six years.<br>f) Explain that in years when an inspection report signed and sealed by a licensed professional engineer is not required, an owner shall submit the annual inspection report for Virginia regulated impounding structures.<br>g) Specify that the owner of an impounding structure shall notify the Department immediately of any change in the use of the area downstream that would cause the impounding structure to impose a hazard to life or property in the event of failure. |
| 4 VAC 50-20-110 | | This section currently contains the requirement for a newly constructed impounding structure to apply for a regular operation and maintenance certificate. | Repealed; requirements are incorporated into sections 4 VAC 50-20-70 and 4 VAC 50-20-80. |
| 4 VAC 50-20-120 | | This section currently contains the requirement for an existing impounding structure to obtain a regular operation and maintenance certificate. | Repealed; requirements are incorporated into 4 VAC 50-20-105. |
| | 4 VAC 50-20-125 | The current regulations do not contain a delayed effective date provision for impounding structures in existence as of the time of their adoption, though 4VAC50-20-130 and 4VAC50-20-140 do permit the Board to relax evaluation standards for existing impounding structures if appropriate. | As explained elsewhere, public safety is not dependent upon the age of an impounding structure, but rather the condition of an impounding structure. Thus, there is no defensible basis for treating existing and new impounding structures differently. To allow owners of impounding structures who are compliant with the current regulations adequate time to prepare for and commence alterations to their spillways mandated by the proposed regulations, however, this section:<br>a) Establishes a delayed effective date for impounding structures determined to have an adequate spillway capacity prior to the effective date of these regulations but that would require modifications due to changes in the regulations.<br>b) Specifies that this would only apply to impounding structures currently operating under a regular operation and maintenance certificate.<br>c) Specifies that the owner shall submit to the |

| | | | |
|---|---|---|---|
| | | | Board an alteration permit application to address spillway capacity deficiencies at the time of the expiration of their regular operation and maintenance certificate or within 3 years of the effective date of these regulations, whichever is later.<br>d) Specifies that the alteration permit application shall contain a construction sequence with milestones for completing the necessary improvements within 5 years of the issuance of an alteration permit.<br>e) Specifies that if circumstances warranted more immediate repairs to the impounding structure, the Board may direct alterations to the spillway to be completed sooner.<br>f) Specifies that during this delay period, owners are required to address other deficiencies that may exist that are not related to the spillway design flood. |
| 4 VAC 50-20-130 | | The current regulations authorize the use of incremental damage analysis on only those impounding structures constructed before July 1982. This analysis is also available only to impounding structures that meet certain conditions. There is currently no minimum threshold for a reduction if one is available. | Repealed; the provisions of this section are amended and incorporated into 4 VAC 50-20-52. |
| 4 VAC 50-20-140 | | This section that states that impounding structures issued a construction permit after July 1, 1982, 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. | Repealed. As mentioned previously, this repeal eliminates the dichotomy between new and existing impounding structures, which is not defensible on the basis of public safety. |
| 4 VAC 50-20-150 | | This section allows the Board to issue a conditional operation and maintenance certificate for an impounding structure where the impounding structure has deficiencies, but the deficiencies do not pose an imminent danger to life or property. Conditional certificates are valid for a period of two years, and may be renewed if the owner | While retaining much of the current section's provisions, the proposed regulations:<br>a) Update language used in the section to refer to conditional certificates for high, significant, and low hazard potential impounding structures.<br>b) Clarify that conditional permits are "extended" and not "renewed". |

| | | | |
|---|---|---|---|
| | | submits annual inspections and can demonstrate progress toward the repairs needed to the impounding structure. | |
| | 4 VAC 50-20-155 | The current regulations allow for the renewal of a conditional operation and maintenance certificate for an impounding structure if certain conditions are met, and the owner is proceeding with necessary repairs to the impounding structure. | The proposed regulations create a new section specifying that the Board may extend an operation and maintenance certificate (either regular or conditional) for impounding structures provided that the owner submits a written request justifying an extension, the amount of time needed to comply with the requirements set out in the current operation and maintenance certificate, and any required fees. The owner must have demonstrated substantial and continual progress towards meeting the requirements. This provision was added to bring the regulations into alignment with agency practice which, while permitted under the current regulations, is not clearly set forth in those regulations. |
| 4 VAC 50-20-160 | | This section currently provides that an owner shall not, through action or inaction, cause or allow an impounding structure to impound water following receipt of a report from an engineer that the impounding structure will not safely impound water. | The proposed regulations retain the requirements of the current section and additionally incorporate the Code requirement added following the 2006 General Assembly that dam owners shall not permit the growth of trees and other woody vegetation and shall remove any such vegetation from the slopes and crest of embankments and the emergency spillway area, and within a distance of 25 feet from the toe of the embankment and abutments of the dam. |
| | 4 VAC 50-20-165 | The current regulations do not contain an explicit section on agricultural purpose dams but do define that term in 4VAC50-20-30. | The proposed regulations create a new section explicitly stating that, in conformance with the Dam Safety Act, dams 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 are exempt from the regulations. The new section also establishes a non-mandatory owner exemption validation process. |
| 4 VAC 50-20-170 | | The current regulations require that the Director of DCR be notified prior to the transfer of ownership of an impounding structure that is the holder of a certificate. The specific requirements for the information to be contained in the notification is set forth in a form incorporated into the regulations. Additionally, the new owner is required to certify that he is aware of the Board's certificate | Similar to 4VAC50-20-90, in dealing with certificates (as opposed to permits), the new regulations clarify that 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 notification with the Department. The amended section also establishes transfer notification requirements, which are currently contained in a form incorporated by reference into the regulations. As with other forms incorporated into the regulations, this form is being removed for easier updating and modification from a format standpoint. |

| | | | |
|---|---|---|---|
| | | requirements and that he will comply with the terms and conditions of any permits/certificates. | |
| | 4 VAC 50-20-175 | The current regulations, in 4 VAC 50-20-120(B)(4) and 4 VAC 50-20-70(B)(17), contain requirements for the development of an emergency action plan for an impounding structure under construction or applying for a regular operation and maintenance certificate; the only explicit requirements for its contents, however, are contained in a form incorporated into the regulations by reference. | In order to clarify the applicability of the requirement for an emergency action plan and its required contents, to incorporate current requirements from the form into the body of the regulation itself, and to ensure that emergency action plans afford adequate protection to the public, the proposed regulations:<br>a) Create a new section establishing emergency action plan requirements for high and significant hazard potential impounding structures.<br>b) Establish that the emergency action plan shall be submitted every six years with the owner's submittal of their regular operation and maintenance certificate application.<br>c) Require a drill to be conducted annually and a table-top exercise to be conducted every once every 3 years.<br>d) Require owners to test existing monitoring, sensing, and warning equipment at remote or unattended impounding structures at least twice per year and maintain a record of such tests.<br>e) Establish that the emergency action plan shall contain the following elements: notification chart; a discussion of the procedures for timely and reliable detection, evaluation, and classification of emergency situations considered to be relevant to the project setting and impounding features; responsible parties for emergency action plan related tasks; a section that describes preparedness actions to be taken both before and following development of emergency conditions; a dam break inundation map; appendices; a certification section that is signed by all parties with assigned responsibilities in the emergency action plan.<br>f) Specified that development of the emergency action plan shall be coordinated with all entities, jurisdictions, and agencies that would be affected by a structure failure or that have statutory responsibilities for warning, evacuation, and post-flood actions. |
| | 4 VAC 50-20-177 | The current regulations, in 4 VAC 50-20-120(B)(4); 4 VAC 50-20-70(B)(17), contain requirements for the development of an emergency action plan for an impounding structure under construction or applying for a regular operation and maintenance | As implied by their hazard classification title, low hazard classification impounding structures pose a lesser risk to the public than do high or significant class impounding structures. Therefore, the proposed new section imposes less strenuous emergency planning requirements upon this class of impounding structure. In all, this section:<br>a) Creates new emergency preparedness |

| | | | |
|---|---|---|---|
| | | certificate; the only explicit requirements for its contents, however, are contained in a form incorporated into the regulations by reference. | requirements for each low hazard potential impounding structure, including the maintenance of information relating to the dam and downstream property owners, the development of procedures for the detection, evaluation, and classification of emergency situations that may arise at the impounding structure site, the development of a simple map displaying downstream property owners and their contact information, a determination of rainfall levels that will establish a Stage I, Stage II, or Stage III condition as set forth in 4VAC50-20-30, and requirements for communication of this information to state and local officials. |
| 4 VAC 50-20-180 | | The current regulations contain provisions relating to inspections of impounding structures; such provisions were incorporated into the Dam Safety Act (§ 10.1-604 et seq. of the Code of Virginia) by the 2006 General Assembly. This section also provides that all inspections that the owner is required to carry out under the regulations are to be conducted by a licensed professional engineer. | The amended section updates the language of the previous section to reflect Code authorities adopted during the 2006 General Assembly related to inspections. Previous requirements of the section were retained to the extent permissible under the Dam Safety Act, § 10.1-604 et seq. of the Code of Virginia. |
| 4 VAC 50-20-190 | | The current section uses "director" and "board" in lower case. | The proposed regulations merely capitalize "Director" and "Board". |
| 4 VAC 50-20-200 | | The current regulations provide that the Board may seek a judicial injunction against any person failing to obey an order of the Board or DCR Director. The Board's enforcement powers were expanded by the 2006 General Assembly. | The proposed regulations update the section to reference the enforcement authorities setout in the Dam Safety Act, § 10.1-604 et seq. Many of these authorities were adopted by the 2006 General Assembly and do not need to be repeated in the regulations. |
| 4 VAC 50-20-210 | | The current regulations allow the Board to engage "consulting boards" in deciding questions relating to the safety of an impounding structure. | To avoid confusion between the Board and "consulting boards," the proposed regulations change consulting "boards" to consulting "committees". |
| 4 VAC 50-20-220 | | The current regulations prohibit the maintenance of an unsafe condition at an impounding structure, specify steps to be taken by the | In addition to current provisions of this section, the proposed regulations:<br>a) Referenced the Code section enacted during the 2006 General Assembly that discusses the designation of dams as unsafe. |

| | | | |
|---|---|---|---|
| | | Director in the event that an imminent danger is posed by an impounding structure, and require that an owner whose impounding structure poses a non-imminent danger must take steps to remedy deficiencies. | b) To allow for emergency situations to be addressed in a timely manner, specify that if an owner or the owner's engineer has determined that circumstances are impacting the integrity of the impounding structure which could result in the imminent failure of the impounding structure, temporary repairs may be initiated prior to approval from the Board. The owner shall notify the Department within 24 hours of identifying the circumstances impacting the integrity of the impounding structure. Such emergency notification shall not relieve the owner of the need to obtain an alteration permit as soon as may be practicable, nor shall the owner take action beyond that necessary to address the emergency situation. |
| 4 VAC 50-20-230 | | Complaints could be filed if the complainant was endangered by the construction, maintenance or operation of a dam.<br>The current section uses "director" and "board" in lower case. | The proposed regulations added "alteration" to the series of items for which a complaint could be filed.<br>The proposed regulations merely capitalize "Director" and "Board". |
| 4 VAC 50-20-240 | | The current regulations require that present, projected and potential future land use conditions be considered in determining the runoff characteristics of a drainage area analysis conducted in designing an impounding structure. | The proposed regulations specify that present and planned land use conditions shall be considered in determining the runoff characteristics of the drainage area rather than present, projected and potential future land use conditions. This is believed to be a fairer standard for the regulated community, as the current section would conceivably require a person analyzing a drainage area to consider the highest level of development for every site regardless of whether such development is ever likely to occur downstream. |
| 4 VAC 50-20-250 | | The current section specifies that the design flood to be utilized in impounding structure evaluation, design, construction, operation and maintenance be commensurate with the impounding structure's size and hazard potential, and be selected using competent, experienced, professional engineering judgment. | The proposed regulations repeal this section; the design flood to be utilized in impounding structure evaluation, design, construction, operation and maintenance is specified by 4VAC50-20-50. |
| 4 VAC 50-20-260 | | The current regulations contain requirements for the construction of emergency spillways. | In addition to several administrative clarifications made to this section, the proposed regulations note the prohibition by § 10.1-609.2 of the Code of Virginia of trees and other woody vegetation in the emergency spillway area. |

| | | | |
|---|---|---|---|
| 4 VAC 50-20-270 | | The current regulations contain requirements related to construction of principal spillways. | The proposed regulations contain a number of administrative clarifications to this section; it is believed that these clarifications do not affect the substance of the section. |
| 4 VAC 50-20-280 | | The current section uses "director" in lower case. | The proposed regulations merely capitalize "Director".<br>It also specifies that the owner's professional engineer is "licensed". |
| 4 VAC 50-20-290 | | The current regulations require that components of an impounding structure be durable in keeping with the design and planned life of the impounding structure. | The proposed regulations clarify that components must be durable or replaced in keeping with the design and planned life of the impounding structure. This reflects agency practice of requiring replacement of components as they may individually wear out. |
| 4 VAC 50-20-300 | | The current regulations contain requirements related to flood routing considerations to be taken into account in designing an impounding structure. | The proposed regulations clarify that freeboard determination and justification must be addressed by the owner's engineer during the design phase. |
| 4 VAC 50-20-310 | | The current regulations contain requirements related to the content of plans and specifications for an impounding structure. | The proposed regulations contain clarifications of the requirements presently contained in this section, including a requirement for drawings and a requirement for an erosion and sediment control plan for those projects that require a land-disturbing permit under the Erosion and Sediment Control Law (§ 10.1-560 et seq. of the Code of Virginia). |
| 4 VAC 50-20-320 | | The current regulations contain a list of acceptable engineering references for utilization in developing the plans and specifications required by the regulations. | The proposed regulations include a clarification that to ensure adequate design, engineers must choose one set of criteria from the list of acceptable references and apply such criteria to the project as a whole, rather than picking and choosing among the references for various portions of a project. The new section also adds the design procedures, manuals and criteria used by the United States Federal Energy Regulatory Commission as an acceptable reference. |
| | 4 VAC 50-20-330 | The current regulations contain a list of acceptable engineering references for utilization in developing the plans and specifications required by the regulations. | The proposed regulations add additional Federal Emergency Management Agency references including but not limited to emergency action plans and inflow design floods to the list of acceptable references. |
| | 4 VAC 50-20-340 | The current regulations contain no fees for permits or certificates issued by the | The proposed regulations:<br>a) Create a new section that cites the authority for the Board to establish and collect application fees |

| | | | |
|---|---|---|---|
| | | Board. The Board is given the authority to establish fees by § 10.1-613.5 of the Dam Safety Act. | for the administration of the dam safety program, administrative review, certifications, and the repair and maintenance of impounding structures<br>b) Specify that the fees will be deposited into the Dam Safety, Flood Prevention and Protection Assistance Fund. |
| | 4 VAC 50-20-350 | The current regulations contain no fees for permits or certificates issued by the Board. The Board is given the authority to establish fees by § 10.1-613.5 of the Dam Safety Act. | The proposed regulations:<br>a) Specify that no application for an operation and maintenance certificate or a construction permit will be acted upon by the Board without full payment of the required fees<br>b) Set out fee submittal procedures. |
| | 4 VAC 50-20-360 | The current regulations contain no fees for permits or certificates issued by the Board. The Board is given the authority to establish fees by § 10.1-613.5 of the Dam Safety Act. | The proposed regulations:<br>a) Specify that all impounding structures owned by Virginia Soil and Water Conservation Districts are exempt from all fees, as provided for by the Dam Safety Act.<br>b) Specify that there will be no fee assessed for the decommissioning of an impounding structure. |
| | 4 VAC 50-20-370 | The current regulations contain no fees for permits or certificates issued by the Board. The Board is given the authority to establish fees by § 10.1-613.5 of the Dam Safety Act. | The proposed regulations establish the following construction permit fees: $2,500 for high or significant hazard potential impounding structures; and $1,000 for low hazard potential impounding structures. It is believed that these fees, combined with other fees collected under these regulations, will be sufficient to fund the position of one additional dam safety engineer to aid the Board in the administration of the Commonwealth's dam safety program. |
| | 4 VAC 50-20-380 | The current regulations contain no fees for permits or certificates issued by the Board. The Board is given the authority to establish fees by § 10.1-613.5 of the Dam Safety Act. | The proposed regulations establish the following 6-year regular operation and maintenance certificate fees: $1,500 for high hazard potential; $1,000 for significant hazard potential; and $600 for low hazard potential. It is believed that these fees, combined with other fees collected under these regulations, will be sufficient to fund the position of one additional dam safety engineer to aid the Board in the administration of the Commonwealth's dam safety program. |
| | 4 VAC 50-20-390 | The current regulations contain no fees for permits or certificates issued by the Board. The Board is given the authority to establish fees by § 10.1-613.5 of the Dam Safety Act. | The proposed regulations:<br>a) Establish the following conditional operation and maintenance certificate or extension of a conditional operation and maintenance certificate fees for high or significant hazard potential impounding structures: $1,000 for a 2-year certificate; $750 for a 1.5-year certificate; $500 for a 1-year certificate; and $250 for a 6-month certificate<br>b) Establish the following conditional operation and maintenance certificate or extension of a |

| | | | |
|---|---|---|---|
| | | | conditional operation and maintenance certificate fees for low hazard potential impounding structures: $500 for a 2-year certificate; $375 for a 1.5-year certificate; $250 for a 1-year certificate; and $125 for a 6-month certificate<br>c) Establish the following conditional operation and maintenance certificate or extension of a conditional operation and maintenance certificate fees for any impounding structure that requires a modification in spillway capacity due to changes in the regulations and that is eligible for a delayed effective date: $200 for a 2-year certificate; $150 for a 1.5-year certificate; $100 for a 1-year certificate; and $50 for a 6-month certificate<br>d) Specify that the Board may allow a partial credit towards the regular operation and maintenance certificate fee if the owner of the impounding structure has completed, to the Director's satisfaction, the conditions of the conditional certificate prior to its expiration.<br><br>It is believed that these fees, combined with other fees collected under these regulations, will be sufficient to fund the position of one additional dam safety engineer to aid the Board in the administration of the Commonwealth's dam safety program. |
| | 4 VAC 50-20-400 | The current regulations contain no fees for permits or certificates issued by the Board. The Board is given the authority to establish fees by § 10.1-613.5 of the Dam Safety Act. | The proposed regulations establish a fee of $225.00 for the review of an incremental damage analysis submitted pursuant to 4 VAC 50-20-52. Re-review of analysis shall cost an additional $45.00. |
| FORMS | | The current regulations include forms incorporated by reference that contain basic requirements regarding plans and specifications submitted pursuant to these regulations. | Struck all of the forms incorporated by reference and incorporated required elements of the forms into the regulations. This will allow for the modification of forms without going through a regulatory action. The Department will still utilize a public process to make substantial changes to the forms. |