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Final 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	April 7, 2008

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

Please provide a brief summary (no more than 2 short paragraphs) of the proposed new regulation, proposed amendments to the existing regulation, or the regulation proposed to be repealed. Alert the reader to all substantive matters or changes. If applicable, generally describe the existing regulation. Also, please include a brief description of changes to the regulation from publication of the proposed regulation to the final regulation.

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 final 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. [The final regulations further refined and simplified the requirements of

Table 1 as well as created "special criteria" for certain low hazard impounding structures, resulting in a 57% reduction in estimated potential spillway upgrade costs for regulated dams from the proposed regulations to the final regulations];

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. [In the final regulations the application fees were reduced from those set out in the proposed regulations. Construction remained the same but Regular O&M, Conditional O&M, and Incremental Damage Assessment fees were reduced or eliminated. This resulted in an overall annual reduction in revenue from fees of approximately 60%];
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
- NOIRA – Notice of Intended Regulatory Action
- FEMA – Federal Emergency Management Agency
- Additionally, the terms "dam" and "impounding structure" may be used interchangeably.

Statement of final agency action

Please provide a statement of the final action taken by the agency including (1) the date the action was taken, (2) the name of the agency taking the action, and (3) the title of the regulation.

This action to amend and adopt final regulations 4 VAC 50-20, Impounding Structure Regulations was unanimously approved by the Virginia Soil and Water Conservation Board on February 1, 2008.

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 numbers, if applicable, and (2) promulgating entity, i.e., 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 DCR in July of 2005 to submit a NOIRA to consider changes and solicit recommendations related to the Board's Virginia Impounding Structure Regulations. The Board subsequently authorized and directed the filing of the proposed regulation at its November 15, 2006 meeting. At its February 1, 2008, the Board approved, authorized and directed the filing of the final regulations.

Purpose

Please explain the need for the new or amended regulation. Describe the rationale or justification of the proposed regulatory action. Detail the specific reasons it is essential to protect the health, safety or welfare of citizens. Discuss the goals of the proposal 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, 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 identify and explain the new substantive provisions, the substantive changes to existing sections, or both where appropriate. A more detailed discussion is required under the "All changes made in this regulatory action" 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. Class III and Class IV dams are grouped together into the Low category.
- In the final regulation, definitions were added for "Probable loss of life", "May cause loss of life", "No expected loss of life", "Major roadways", and "secondary roadways" in an effort to provide greater clarity to the distinctions between hazard potential classifications.

2) In the final regulation, a new section entitled "Special criteria for certain low hazard impounding structures" was added that specifies that should the failure of a Low hazard potential impounding structure cause no expected loss of human life and no economic damage to any property except property owned by the impounding structure owner, then the owner may follow the following requirements **[4VAC50-20-51]**:

- No dam break inundation zone map required pursuant to section 4VAC50-20-54; (a map would be advisable should development occur downstream);
- The spillway design flood for the impounding structure is recommended as a minimum 50-year flood; however, no specific spillway design flood shall be mandatory;
- No emergency preparedness plan prepared pursuant to 4VAC50-20-177 shall be required;
- An owner still shall perform inspections of the impounding structure; and
- No certificate or permit fee established in this chapter shall be applicable to the impounding structure.
- Of the 30 formerly Class IV dams in the Low classification, approximately 9 dams requiring a potential upgrade under the proposed regulations will not now require an upgrade due to this provision, thus resulting in a reduction in the fiscal impact of about $25 million.

3) 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.
- In the final regulation, within the Significant and Low hazard potential classes, the size categories were removed and a single spillway design flood standard established for each class. This change was instituted as it was agreed that hazard potential classification should be based on threat to life and property and should not be based on the size of the dam.
    - Within the Significant hazard class, the SDF was set at .5 PMF and the incremental threshold at 100-year.
    - Within the Low hazard class, the SDF was set at 100-year and the incremental threshold at 50-year.
        - The Spillway Design Flood standard in many states across the nation is .5 PMF for Significant and 100-year for Low.
        - Within the Significant class, in Virginia, only a handful of the 167 dams in the category are actually engineered to an SDF that exceeds .5 PMF at this time. Those primarily include dams that are owned by corporate utilities, localities, and the state. [29 dams > .5 PMF; only 10 were required to do so]
        - .5 PMF does represent a significant storm event. Tropical storm Gaston was approximately a .5 PMF storm.
        - Of the 167 dams in the Significant classification, approximately 50 dams requiring a potential upgrade under the proposed regulations will not now

require an upgrade, thus resulting in a reduction in the fiscal impact of about $116 million.

Revised and simplified Table 1

Hazard Potential Class of Dam	Spillway Design Flood (SDF) [B]	Minimum Threshold for Incremental Damage Analysis
High	PMF [C]	.50 PMF
Significant	.50 PMF	100-YR[D]
Low	100-YR[D]	50-YR[E]

- In the final regulation, a note was added to encourage dam owners to build to a higher standard. "Due to potential for future development in the dam break inundation zone which would necessitate higher spillway design flood standards or other considerations, owners may find it advisable to consider a higher spillway design flood standard than is required."
- In the final regulation, it was specified that a modified PMF may be calculated utilizing local topography, meteorological conditions, hydrological conditions, or PMP values supplied by NOAA.

4) 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.
- In the final regulation, the prerequisites of the old subsection B of section 130 for determining who was eligible for conducting the engineering assessment were removed thus making the incremental damage assessment truly available to every dam owner to determine if the SDF requirement for their dam may be modified below the stated spillway design flood standard. This had been our intention all along.
- In the final regulation, the term "unacceptable" before "additional downstream threat" was removed and language was added that describes what is and would not be considered an "additional downstream threat".
- In the proposed regulations unacceptable downstream threat was established at "water depths greater than two feet and overbank flow velocities greater than three feet per

second". This was refined in the final regulation to read "when water depths exceed two feet or when the product of water depth (in feet) and flow velocity (in feet per second) is greater than seven". The rule of seven as it might be characterized is utilized by a number of states to denote unacceptable impacts.

5) 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. In the final regulation, the map will specify the areas that might be inundated during both a sunny day failure, a spillway design flood with and without a dam 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. The SDF break mapping is targeted at emergency response and the PMF mapping at hazard potential classification.
- In the final regulation, "Public utilities that may be affected" was added to the list of elements required to be shown on the map. This information is necessary to make informed hazard potential classifications.
- NOTE: Additional authorities relative to dam break inundation zones that complement these regulations were provided to localities and the state during the 2008 legislative session [Chapter 491 (HB837) of the 2008 Virginia Acts of Assembly].

6) In the final regulation, a new section entitled "Reporting" was added **[4VAC50-20-59]**. This section notes that for the purposes of categorizing and reporting information to national and other dam safety databases, the size categorizations in Table 2 should be utilized. This includes both maximum impounding capacity and dam height specifications.

7) 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 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.
- In the final regulation, the term "impounding structure breach" was changed to "impounding structure failure" in order to achieve consistent use of terms within the regulations.

8) 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.

9) 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.
- In the final regulation, the language:
    - Altered the frequency for table top exercises from once every 3 years to once every permit cycle (6 years).
    - Specified that annual drills and table top exercises for multiple impounding structures may be performed in combination if the involved parties are the same.
    - Eliminated the requirement that a critique of the drill and table top exercise be provided to the Department.
    - Clarified that the testing of monitoring, sensing, and warning equipment may be completed on a schedule set by Virginia Department of Emergency Management.
    - Clarified that the notification chart is not a list of every individual that needs to be contacted, but it is a list of those responsible parties that need to be contacted such as emergency management, sheriffs, police, etc.
    - Also clarified that the notification chart shall indicate how downstream property owners will be contacted (such as by reverse 911) and by whom.
    - Specified that the EAP does not have to be signed by all of the responsible parties but shall identify them and include a certification “that the EAP has been received by these parties”.

10) 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).

11) 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, were further reduced from proposed regulations to final regulations. Construction remained the same but Regular O&M, Conditional O&M, and Incremental Damage Assessment fees were reduced or eliminated. This resulted in an overall annual reduction in revenue from fees of approximately 60%.

12) 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.

13) 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.
- In the final regulation:
    - The term “Alteration” was amended to clarify that “structural maintenance does not include routine maintenance”.
    - The term “Impounding structure” was modified to include the word “dam” as a synonym.
    - The term “Normal impounding capacity” was stricken and replaced with a definition for the term “Normal or typical water surface elevation” in order to

more accurately reflect terminology used in the field and to provide clarity for special situations, including flood control and stormwater management dams.
  - A definition for the term "Planned land-use" was added to mean "land-use that has been approved by a locality or included in a master land-use plan by a locality, such as in a locality's comprehensive land-use plan". The regulations specify that planned land-use for which a development plan has been officially approved by the locality in the dam break inundation zones downstream from the impounding structure shall be considered in determining the hazard classification.
  - Where ever "breach" was used, it was changed to "failure" in order to achieve consistent use of terminology in the regulations.

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

- In an effort to provide additional clarity to the permitting process, a number of the following 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.
- **4VAC50-20-60** Required permits.
  - In the final regulation, clarified that a construction permit is required for "new" impounding structures.
- **4VAC50-20-70** Construction permits.
  - In the final regulation, clarified that a profile called for in the section was a "water surface" profile and updated reporting requirement terminologies for upstream and downstream slope and freeboard.
- **4VAC50-20-80** Alterations permits.
  - In the final regulation:
    - Clarified that Alteration permits are not needed for routine maintenance.
    - Clarified that a profile called for in the section was a "water surface" profile.
    - Updated reporting requirement terminologies for upstream and downstream slope and freeboard.
    - Fixed an incomplete sentence regarding the signing and submittal of the Record Report to DCR.
- **4VAC50-20-90** Transfer of permits.
- **4VAC50-20-105** Regular Operation and Maintenance Certificates.
  - In the final regulation, changed the term "floodplain" to "dam break inundation zone".
- **4VAC50-20-150** Conditional Operation and Maintenance Certificate.
  - In the final regulation, specified that the owner's deficiency correction plan is "approved" by the Board not "determined".
- **4VAC50-20-155** Extension of Operation and Maintenance Certificates.
  - In the final regulation, added clarifying language that the owner must be making progress towards meeting the requirements "of the certificate in order to receive an extension".
- **4VAC50-20-160** Additional operation and maintenance requirements.
- **4VAC50-20-170** Transfer of certificates.

15) 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.
- In the final regulation, struck the work "possible" in front of "site visit" to read [..may be verified by the department through a site visit].

16) 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.
- In the final regulation, in section 180, struck the requirement that monitoring shall be "full-time".

17) Updates the section **[4VAC50-20-20]** to specify that the design, inspection and maintenance of impounding structures shall be conducted utilizing competent, experienced, engineering judgment that takes into consideration factors including but not limited to local topography and meteorological conditions. This change is clarifying in nature and reflects current program administration.

- In the final regulation, clarified that the forms "noted" in the regulation are available on the DCR website.

18) In the final regulation, added an additional existing section **[4VAC50-20-190]** to the final regulation and modified it to additionally allow for an informal hearing should an owner be aggrieved by an action of the director or board. Also specified that a formal hearing may only be granted with the consent of the Board.

19) General improvements to sections for clarity.

- **4VAC50-20-210** Consulting committees.
- **4VAC50-20-230** Complaints.
- **4VAC50-20-240** Design of structures.
- **4VAC50-20-260** Spillway design.
  - In the final regulation, added an explanatory note on overtopping to explain that overtopping is an example of an occurrence that jeopardizes the safety of the impounding structure.
- **4VAC50-20-270** Principal spillways and outlet works.
- **4VAC50-20-280** Drain requirements.
  - In the final regulation, clarified that existing drains shall be kept operational and that when practicable existing impounding structures shall be retrofitted to permit draining.
- **4VAC50-20-290** Life of impounding structures.

  - In the final regulation, clarified that impounding structure components shall be maintained.
- **4VAC50-20-300** Additional design requirements.
- **4VAC50-20-310** Plans and specifications.
- **4VAC50-20-320** Acceptable design procedures and references.
  - In the final regulation, fixed a typo; "Agency" to "Energy"
- **4VAC50-20-330** Other applicable dam safety references.
  - In the final regulation, specified that other dam safety references may include manuals, guidance, and forms provided by the Department.

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 there are no disadvantages to the public or the Commonwealth, please indicate.

The primary advantage of the final regulations is the enhancement of public safety. The final 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 currently existing regulations 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 final 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.

Potential failure of dams or living downstream of dams that are in need of upgrades may impact property and insurance values. Implementation of these regulations will reduce factors that can cause 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 final regulations to private citizens, local governments, and agencies of the Commonwealth are upgrading and repair costs for those 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 was approximately $249 million. Revisions made within the final regulations reduce this spillway upgrade cost by approximately $142 million or put another way, represent a 57% reduction in spillway upgrade costs from the proposed regulations to the final regulations.
[Cost of Regulation: $248,954,375 - $116,730,000 (due to Spillway Design Flood requirement changes in Table 1) = **$132,224,375 -** $25,275,000 (due to creation of a new section entitled "Special criteria for certain low hazard impounding structures") = **$106,949,375** (57% reduction in costs)]

While still substantial, these costs are markedly reduced from the proposed regulations, and 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. In the final regulations the application fees were reduced from those set out in the proposed regulations. Construction remained the same but Regular O&M, Conditional O&M, and Incremental Damage Assessment fees were reduced or eliminated. This resulted in an overall annual reduction in revenue from fees of approximately 60%.
[$127,925 **to $51,700** annual fee revenue estimate.]

Changes made since the proposed stage

Please describe all changes made to the text of the proposed regulation since the publication of the proposed stage. For the Registrar's office, please put an asterisk next to any substantive changes.

Section number	Requirement at proposed stage	What has changed	Rationale for change
4VAC50-20-20	In subsection F, it references the forms "called for" in this chapter.	The terminology was changed from "called for" to "noted".	As the incorporation of the forms has been repealed from this regulation, the change in terminology was warranted.
4VAC50-20-30	The term dam and impounding structure are utilized throughout this section and the regulation to refer to the regulated structures.	Where it was reasonable to do so, the term "dam" was changed to "impounding structure". In the definition of "impounding structure" we also added "or dam" for those areas where it was inadvisable to alter the existing language.	The public had been confused about the use of two terminologies and inquired whether they were different and whether clarification could be provided.

4VAC50-20-30	The definition of alteration from the Code was included in the regulation. Structural repairs or structural maintenance are considered an alteration per the definition.	A statement was added that specifies that "structural maintenance does not include routine maintenance".	Although it is the intent of the definition of alteration already, the statement was added to clarify that structural maintenance does not include routine maintenance at the request of a commenter.
4VAC50-20-30	The term, "normal impounding capacity," referred to the volume of water or other materials capable of being impounded at the lowest ungated outlet from the impoundment.	The term, "normal or typical water surface elevation" replaces the term "normal impounding capacity." This new definition also adds clarifications regarding situations where the normal pool of the impoundment is different than the level at the lowest ungated outlet and regarding flood control/stormwater detention facilities.	The new term and definition was added due to requests during the public comment period for additional clarity in this section, especially concerning flood control structures.
4VAC50-20-30	There was no definition for the term "planned land use," which is used in the regulations on multiple occasions.	A definition for the term, "planned land use" has been added. That definition specifies that the term means "land use that has been approved by a locality or included in a master land use plan by a locality, such as in a locality's comprehensive land use plan."	Due to the term "planned land use" being applied to matters including the hazard classification of dams, numerous public comments had requested clarification of the meaning of that term.
4VAC50-20-30	The terms "breach" and "failure" are used interchangeably in the definition of "Stage II Condition" and elsewhere throughout the regulation.	The term "failure" has been substituted for the term "breach" throughout the regulation.	The public had been confused as to whether there was a difference between a "dam breach" and a "dam failure." The change reflects the intent that the two terms have the same meaning.
4VAC50-20-40	The terms "probable loss of life", "may cause loss of life", and "no expected loss of life" were not defined by the proposed regulations.	Definitions for the terms "probable loss of life", "may cause loss of life", and "no expected loss of life" have been added to section 40.	The three defined terms are utilized in determining the proper hazard classification of a dam. Numerous public comments requested that they be better defined to allow for more accurate classifications.
4VAC50-20-40	Dams whose failure would affect "primary" public utilities were to be considered high hazard. Dams whose failure would affect "secondary" public utilities could be considered either significant or low hazard dams.	The qualifiers of "primary" and "secondary" have been removed from the regulations. The effect of a dam failure upon any type of utility may now be considered in making any hazard potential determination.	Following receipt of public comments on this subject, it is believed that damages to utilities are more appropriately categorized by their degree, and not necessarily by the type of utility damaged.
4VAC50-20-40	In making hazard potential determinations, it was	The qualifier of "public" has been removed, requiring that	Dam failures frequently damage both public and

	required that impacts to various types of "public" roadways be considered. The terms "major roadways" and "secondary roadways" were not defined.	impacts to both private and public roadways be considered in making a hazard potential classification. To help distinguish among types of roadways, definitions for the terms "major roadways" and "secondary roadways" have been added.	private roadways (e.g., subdivision roadways). Private roadways may, at times, be traveled as heavily as certain public roadways. Therefore, it is believed to be proper to consider impacts to both private and public roadways, and to distinguish among them based upon type and volume.
4VAC50-20-40	The specifications of the term "low hazard potential" stated that the failure of a dam with that classification may cause economic damage to building(s), industrial or commercial facilities, secondary public utilities, secondary public roadways, railroads, personal property and agricultural interests. This same set of specifications was utilized in the definition of the term "significant hazard potential".	The specification has been removed from the definition of "low hazard potential".	The inclusion of the specification in the definition of "low hazard potential" was an error. Removing the detailed language associated with "economic damage" establishes a distinction between the significant and low classifications. The definition of the term "low hazard potential" continues to note that no more than minimal economic damage is to be expected from the failure of a dam of that classification.
4VAC50-20-40	Both the hazard potential classification and the size category for the hazard classification were to be proposed by the owner.	Size categories were removed from the spillway design classification determinations in Table 1 thus the removal of the reference to size categories in this section was necessary.	A number of public comments challenged the proposed regulations on the basis that it was the degree of damage that could be caused by a dam, and not its size that should be considered in making a hazard potential determination. In response to these comments, it was determined that size categories should be removed.
4VAC50-20-40	It was required that present and planned land use be considered when classifying a dam.	It is clarified that present and planned land use "for which a development plan has been officially approved by the locality" is to be considered in making a hazard potential classification.	A number of public comments asked for clarification as to what stages of development (present, proposed, approved, projected, etc.) had to be considered in making a hazard potential classification. The change clarifies the intent of the regulations.
4VAC50-20-50	It had been specified that	The specification has been	Determining maximum

	"Maximum Impounding Capacity and Height shall be determined in accordance with the definitions provided in 4VAC50-20-30."	removed. The section now notes that Table 1 is applicable to all impounding structures that are 25 feet or greater in height and that create a maximum impounding capacity of 15 acre-feet or greater, and to all impounding structures that are 6 feet or greater in height and that create a maximum impounding capacity of 50 acre-feet or greater and is not otherwise exempt from regulation by the Code of Virginia.	impounding capacity and height for the purposes of section 50 is no longer necessary, as distinctions based on size have been removed from Table 1 of that section. The new language reflects the requirements of the Code of Virginia to clarify which structures Table 1 applies to.
*4VAC50-20-50	Table 1 contained distinctions based on size for significant and low hazard potential dams. Significant hazard potential dams were required to have spillway design floods ranging from .50 PMF to PMF, and low hazard dams were required to have spillway design floods ranging from 100 year to .50 PMF. The reductions that could be achieved through incremental analysis ranged from 100 year to .50 PMF for significant hazard potential dams, and from 50 year to 100 year for low hazard potential dams.	Table 1 has been revised so that distinctions based on size are removed. All significant hazard potential dams are required to be built to the .50 PMF. All low hazard potential dams are required to be built to the 100 year flood. Incremental analysis may be utilized to reduce the requirement for significant hazard potential dams to the 100 year flood, and to the 50 year flood for low hazard potential dams.	A number of public comments challenged the proposed regulations on the basis that it was the degree of damage that could be caused by a dam, and not its size, that should be considered in making a hazard potential determination. Other comments expressed the concern that several of the spillway design flood requirements contained in the proposed Table 1 were higher than necessary, and would impose an undue financial burden upon dam owners. Table 1 has been revised to no longer distinguish among dams based upon their size, and to establish spillway design flood requirements that are believed to be the minimum necessary to provide adequate protection for public safety.
4VAC50-20-50	Subsection B had stated that "the appropriate size category is determined by the largest size associated with the maximum impounding capacity and height of the impounding structure."	The language contained in subsection B of the proposed regulations has been deleted.	As Table 1 no longer distinguishes between dams based upon their size, the language found in the proposed subsection B is no longer necessary.
4VAC50-20-50	Proposed subsection C of this section and others throughout the regulations use the terms "incremental damage analysis" and	The term "incremental damage analysis" has been substituted for the term "incremental damage assessment" in section 50 and elsewhere throughout the	In order to increase clarity, it is believed to be appropriate to use a single term for the incremental damage analysis.

	"incremental damage assessment" interchangeably.	regulations.	
4VAC50-20-50	The proposed regulations did not advise dam owners to consider building their dams to a spillway design flood greater than that required by the regulations.	Subsection B now states that "due to potential for future development in the dam break inundation zone which would necessitate higher spillway design flood standards or other considerations, owners may find it advisable to consider a higher spillway design flood standard than is required."	Development downstream from a dam frequently causes a need for upgrades in order to meet spillway design flood standards. Often, it is much more cost-effective for dam owners to over-build their dams initially, rather than to upgrade them in the future. The additional language points out that dam owners may wish to consider building to a higher standard than is required in order to avoid a need for upgrading in the future.
4VAC50-20-50	The proposed regulations state that the PMF is derived from the current probable maximum precipitation (PMP) available from the National Weather Service, NOAA.	An added provision was included that in some cases, a modified PMF may be calculated utilizing local topography, meteorological conditions, hydrological conditions, or PMP values supplied by NOAA.	Public comment explained a belief that a site-specific PMF should be permitted to be calculated. It is believed that this may be appropriate when proper factors are considered.
*4VAC50-20-51	The proposed regulations had reduced the number of hazard potential classifications from four to three. In so doing, what had been considered Class IV dams were included in the Low Hazard Potential classification contained in the proposed regulations. Being included in this category would have made Class IV dam owners subject to many requirements of the regulations that they had not previously been subject to.	New section 51 creates a series of special provisions related to certain low hazard dams. These provisions exempt such dams from many requirements of the regulations so long as they are certified as meeting the requirements of the section by a professional engineer. It is anticipated that this section will be utilized by current Class IV dam owners, and result in Class IV dams being treated largely the same under the new regulations as they were under the old regulations.	Class IV dams, by definition, do not pose a threat to human life or the property of anyone except for the dam owner. The requirements for a dam to qualify for the exception contained in section 51 are largely the same as the current requirements for Class IV dams. As these dams pose only a minimal threat, it is believed to be appropriate to exempt such dams from several of the requirements of the regulations. This will save costs for current Class IV dam owners.
4VAC50-20-52	Subsection B of the proposed regulations had set forth a number of prerequisites to a dam owner being eligible to conduct an incremental damage analysis to potentially reduce spillway design flood requirements for a dam. These prerequisites were largely a	The prerequisites that were included in subsection B of the proposed regulations have been deleted.	The intent of the new regulations is to make the incremental damage analysis available to all dam owners. The prerequisites contained in the proposed regulations would not have accomplished this intent.

	carryover from section 130 of the old regulations.		
4VAC50-20-52	Proposed subsection C of section 52 did not clearly state that site-specific conditions should be recognized and considered in completing an incremental analysis.	A statement that, "site-specific conditions should be recognized and considered" has been added to subsection B of section 52 (formerly proposed subsection C).	The statement added to subsection B clarifies the intent of the subsection.
4VAC50-20-52	Proposed subsection C of section 52 had specified 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 downstream threat to persons or property.	Subsection B of the final regulation replaces the statement from the proposed regulations with a statement that "An additional downstream threat to persons or property is presumed to exist when water depths exceed two feet or when the product of water depth (in feet) and flow velocity (in feet per second) is greater than seven.	The language in the proposed regulations was intended to be based on the "Rule of 7s", a methodology used by other states for determining unacceptable downstream threats posed by dams. More accurate language was discovered since the time of the proposed regulations and the new language was inserted to ensure accuracy and clarity.
4VAC50-20-52	The proposed regulations did not include any statement clarifying that the Board may review spillway design flood requirements based on changed conditions at and downstream of a dam.	New subsection D of section 52 provides that "The required spillway design flood shall be subject to reclassification by the board as necessary to reflect changed conditions at the impounding structure and in the dam break inundation zone."	The hazard classification and spillway design requirements are based upon what is located downstream of a dam, and the results of an incremental damage analysis are dependent on the characteristics of an impoundment and what is located downstream. As downstream conditions can change frequently, review of spillway design requirements is needed on an ongoing basis. The added language clarifies that the Board may undertake this review.
4VAC50-20-54	Subsection B of proposed section 54 had stated that mapping the inundation zone of a dam to a level where the water surface elevation of the dam break inundation zone and the water surface elevation during a nonfailure event converge to within one foot of each other was demonstrative of "a level where failure of the dam does not further constitute a hazard to downstream life or	The language indicating that the mapping level contained in the proposed regulation demonstrates a level where failure of the dam does not further constitute a hazard to downstream life or property has been removed.	The statement contained in the proposed regulations was in conflict with the Rule of 7s contained in section 52, which provides a rationale for determining downstream threat that is utilized by other states. Removing the language from section 54 eliminates this conflict and allows the more reliable Rule of 7s analysis to clearly govern.

	property."		
4VAC50-20-54	Proposed subsection B had stated that "The inundation maps shall be supplemented with water surface profiles and cross sections at critical areas."	The phrase "and cross sections at critical areas" has been removed.	Requiring cross-sections provides detail beyond what is necessary to make an accurate determination as to hazard and imposes significant cost on dam owners. Public comment requested that this requirement be removed.
4VAC50-20-54	Subdivision (D)(2) of the proposed regulations required mapping of a probable maximum flood with a dam failure.	Subdivision (D)(2) has been revised to replace "a probable maximum flood" with "the spillway design flood."	The proper flood event to be mapped is the spillway design flood, and not the probable maximum flood (a requirement for probable maximum flood mapping was added to subdivision (D)(4)). The amendment corrects this.
4VAC50-20-54	Subdivision (D)(3) of the proposed regulations required mapping of a "dam break analysis utilizing the probable maximum flood without a dam failure."	As with the immediately preceding comment, "probable maximum flood" has been replaced with the "spillway design flood." In addition, the specification that the analysis should be a "dam break" analysis has been removed.	As with the immediately preceding comment, the spillway design flood is the proper flood event to be mapped. Additionally, terming this analysis a "dam break" analysis caused confusion that was pointed out in public comment, as the subdivision goes on to specify that this map should be drawn "without a dam failure." The amendment is intended to remove this confusion.
4VAC50-20-54	The proposed regulations contained no mapping requirement related to potential future development in the dam break inundation zone.	Subdivision (D)(4) was added to the regulations to require that a probable maximum flood event with a dam failure be mapped for purposes of evaluating the impacts of future development on a dam.	Development within a dam break inundation zone affects the hazard classification and spillway design requirements of a dam. The only way to determine the effects that downstream development has on a dam is to evaluate its location within a dam break inundation zone through precise mapping. A map of a probable maximum flood with a dam failure represents the worst flood that could impact the area downstream of a dam; therefore, utilizing it in reviewing the impacts of development allows full review of the potential

			impacts of a dam under the most serious circumstances.
4VAC50-20-54	Subdivision (F)(1) omitted public utilities from its list of facilities required to be shown on a dam break inundation zone map for emergency action planning purposes.	"Public utilities that may be affected" have been added to the list of facilities required to be shown on a dam break inundation zone map in subdivision (F)(1).	Impacts to public utilities may affect both public safety and economic interests and they should be considered in developing an emergency action plan for a dam.
4VAC50-20-54	Subdivision (F)(2) had stated that each dam break inundation zone map should include a note that states "Mapping of flooded areas and flood wave travel times are approximate. Timing and extent of actual inundation may differ from information presented on this map."	The statement from the proposed regulations has been replaced with language requiring that each dam break inundation zone map include a statement that "The information contained in this map is prepared for use in notification of downstream property owners by emergency management personnel."	It was pointed out in public comment that the statement contained in the proposed regulations did little to aid those utilizing dam break inundation zone maps for emergency planning purposes, and may cause confusion. The statement that has been substituted clarifies the intended use of the maps.
4VAC50-20-59	This section was not included in the proposed regulations. Size categories of impounding structures were included in Table 1 of section 50.	The size categories contained in Table 1 of section 50 have been removed due to amendments of the requirements of that section. Section 59 has been created and includes Table 2, which specifies the size categories of dams.	While size categories may no longer be utilized in determining the spillway design requirements of a dam, they are important for categorization and reporting purposes, as well as comparison of dams across the Commonwealth and the United States. New section 59 merely recites these size categories so that they may be known and utilized by the regulated community.
4VAC50-20-60	Subsection A of the proposed regulations stated that no person or entity shall construct or begin to construct an impounding structure until the board has issued a construction permit.	Subsection A has been clarified to specify that no person or entity shall construct or begin to construct "a new" impounding structure until the board has issued a construction permit.	It was pointed out in public comment that construction activities occurring on an existing dam receive an alteration permit, not a construction permit. The amendment merely clarifies that construction permits are intended for new (and not existing) impounding structures.
4VAC50-20-70	Subsection B specified that a design report form "will be" available from the Department of Conservation and Recreation	Subsection B has been amended to specify that a design report form "is" available from the Department	A form for a design report is available from the Department.
4VAC50-20-70	Subdivisions B(6)(f) and (g) required that data related to the slope of a dam be expressed in terms of	Both subdivisions have been amended to require that data related to slope be expressed in terms of "horizontal to vertical."	This amendment was made to conform to trade usage of the terms utilized. It does not alter the intent of the

	"horizontal and vertical."		regulations.
4VAC50-20-70	Subdivision B(7)(g) defined "freeboard" as "normal pool to top of dam."	The definition has been removed from this subdivision.	The term "freeboard" is defined in section 30 of the regulations. An incomplete definition of the term in this section may cause confusion.
4VAC50-20-70	Subdivision B(19) required that other pertinent design data be submitted with an application for a construction permit, including a plan and profile of the dam break inundation zone.	The profile required by subdivision B(19) has been further clarified as a "water surface" profile.	The amendment clarifies what was meant by the requirement contained in the proposed regulations.
4VAC50-20-70	Subdivisions J(2)(f) (6) and (7) required that data related to the slope of a dam be expressed in terms of "horizontal and vertical."	Both subdivisions have been amended to require that data related to slope be expressed in terms of "horizontal to vertical."	This amendment was made to conform to trade usage of the terms utilized. It does not alter the intent of the regulations.
4VAC50-20-70	Subdivision J(2)(g)(7) defined "freeboard" as "normal pool to top of dam."	The definition has been removed from this subdivision.	The term "freeboard" is defined in section 30 of the regulations. An incomplete definition of the term in this section may cause confusion.
4VAC50-20-70	Subdivision J(2)(i) required that confirmation be given as to whether the impounding structure has ever been overtopped.	The confirmation as to overtopping has been removed.	Section 70 deals with construction permits for new dams. A dam that has not yet been constructed/completed cannot have overtopped. The requirement contained in the proposed regulations was an oversight and its presence could have caused unnecessary confusion.
4VAC50-20-80	Subsection A of the proposed regulations contained specifications as to what constitutes an alteration. Structural maintenance was included as an action that constituted an alteration requiring a permit.	A clarification has been added that the term "structural maintenance" does not include "routine maintenance."	Public comments expressed concern that the term "structural maintenance" could be construed to include minor, normal maintenance to a dam. This was not the intent of the regulations and the amendment clarifies that routine maintenance does not require an alteration permit.
4VAC50-20-80	Subsection B specified that a design report form "will be" available from the Department of Conservation and Recreation	Subsection B has been amended to specify that a design report form "is" available from the Department	A form for a design report is available from the Department
4VAC50-20-80	Subdivisions B(6)(f) and (g) required that data related to	Both subdivisions have been amended to require that data	This amendment was made to conform to trade usage of

	the slope of a dam be expressed in terms of "horizontal and vertical."	related to slope be expressed in terms of "horizontal to vertical."	the terms utilized. It does not alter the intent of the regulations.
4VAC50-20-80	Subdivision B(7)(g) defined "freeboard" as "normal pool to top of dam."	The definition has been removed from this subdivision.	The term "freeboard" is defined in section 30 of the regulations. An incomplete definition of the term in this section may cause confusion.
4VAC50-20-80	Subdivision B(16) required that other pertinent design data be submitted with an application for a construction permit, including a plan and profile of the dam break inundation zone.	The profile required by subdivision B(16) has been further clarified as a "water surface" profile.	The amendment clarifies what was meant by the requirement contained in the proposed regulations.
4VAC50-20-80	Subsection I specified that a record report form "will be" available from the Department of Conservation and Recreation	Subsection I has been amended to specify that a record report form "is" available from the Department	A form for a record report is available from the Department
4VAC50-20-80	Subsection I contained an incomplete sentence regarding what needs to be done with a record report.	The incomplete sentence in subsection I has been amended to specify that "The Record Report shall be signed and sealed by a licensed professional engineer and signed by the owner and shall be sent to the department indicating that the modifications made to structural features of the impounding structure have been completed."	The amendment fixes typographical errors in the proposed regulations.
4VAC50-20-80	Subdivisions I(6)(f) and (g) required that data related to the slope of a dam be expressed in terms of "horizontal and vertical."	Both subdivisions have been amended to require that data related to slope be expressed in terms of "horizontal to vertical."	This amendment was made to conform to trade usage of the terms utilized. It does not alter the intent of the regulations.
4VAC50-20-80	Subdivision I(7)(g) defined "freeboard" as "normal pool to top of dam."	The definition has been removed from this subdivision.	The term "freeboard" is defined in section 30 of the regulations. An incomplete definition of the term in this section may cause confusion.
4VAC50-20-80	Subdivisions I(15) and (16) of the proposed regulations required certifications by the dam owner's engineer that information provided pursuant to subdivision I(2) was true and correct, and a certification by the dam owner that he or she had received the information required by subdivision I(2).	The subdivisions have been amended to specify that the certifications apply to all information provided pursuant to subsection I.	It is intended that the certifications apply to all information submitted pursuant to subsection I. Further, there was no subdivision I(2) in the proposed regulations. The amendment clarifies intent and removes an error in the proposed regulations.
4VAC50-20-90	Subsection A specified that a	Subsection B has been amended	A transfer notification form

	transfer notification form "will be" available from the Department of Conservation and Recreation	to specify that a transfer notification form "is" available from the Department	is available from the Department
4VAC50-20-105	Subsection C specified that a Operation and Maintenance Certificate Application form "will be" available from the Department of Conservation and Recreation	Subsection B has been amended to specify that a Regular Operation and Maintenance Certificate application form "is" available from the Department	A form is available from the Department.
4VAC50-20-105	Subdivision E(2)(e)(13) of the proposed regulations required that inspection observations include general information, including notes on new development in the downstream "floodplain" of the dam, that would impact hazard classification.	The term "floodplain" has been replaced with the term "dam break inundation zone." Additionally, a requirement was added that development that would affect spillway design flood requirements be noted.	The intent of the use of the term "floodplain" was to imply the dam break inundation zone of the dam. The amendment clarifies intent and eliminates confusion that could be caused by the use of the term "floodplain." Secondly, the addition of a requirement for consideration of development that could impact spillway design requirements allows the true intent of the subdivision to be achieved, as it is the design of a spillway that protects public safety.
4VAC50-20-150	The proposed regulations had specified that a Conditional Operation and Maintenance Certificate would require that the dam owner correct deficiencies on a schedule "determined" by the board.	The specification that the schedule would be "determined" by the board has been replaced with a specification that the schedule will be "approved" by the board.	Schedules for dam repairs come as a result of consultation between the Board/Department and the dam owner. Specifying that the schedule will be "determined" by the Board negates this cooperative process.
4VAC50-20-155	The proposed regulations contain a sentence that does not clearly and explicitly state that substantial and continual progress towards meeting the requirements of a certificate must be made in order to receive an extension.	Clarifying language has been added to the section to explain that substantial and continual progress towards meeting the requirements of a certificate must be made in order to receive an extension.	The amendment simply clarifies the intent of the section and makes explicit what the proposed regulations had implied.
4VAC50-20-165	Subsection C had specified that an Agricultural Exemption report "may" be verified by the department through a "possible" site visit.	The word "possible" has been removed from subsection C.	As the Report "may" be verified, it is unnecessary to note that a site visit is "possible," as any verification action is entirely voluntary on the part of the Department.
4VAC50-20-170	Subsection A specified that a transfer notification form	Subsection A has been amended to specify that a transfer	A form is available from the Department.

	"will be" available from the Department of Conservation and Recreation	notification form "is" available from the Department	
4VAC50-20-175	Subsection D required the owner to update an Emergency Action Plan immediately upon becoming aware of necessary changes.	A requirement for the updated Emergency Action Plan to be resubmitted has been added.	Emergency Action Plans are intended to be used by a variety of agencies in the event of an emergency at the dam in order to protect life and property. Ensuring the submission of updates helps ensure that important information is available to all parties and allows the Department to verify changes needed to the EAP.
4VAC50-20-175	Subsection E required table top exercises to be conducted once every three years.	The requirement for table top exercises to be conducted once every three years has been changed to once every six years, although more frequent exercises are encouraged. Additionally, a clarification was added that drills and table top exercises for multiple dams may be combined where the involved parties are the same.	Public comment explained that conducting table top exercises once every three years could be overly burdensome on dam owners. Public comment additionally requested clarification as to whether owners of multiple dams could combine the drills and table top exercises for those dams where the situations would be similar.
4VAC50-20-175	Subsection E required dam owners to submit a critique of emergency action plan exercises to the Department.	The requirement for the submission of a critique has been removed.	Public comment requested that the requirement for the submission of a critique for emergency action plan exercises to be removed to allow dam owners to focus on carrying out the exercises, rather than reporting to the Department.
4VAC50-20-175	Subsection F required dam owners to test monitoring, sensing, and warning equipment at remote or unattended dams at least twice per year.	Language has been added providing that testing shall occur twice per year or as performed by the Virginia Department of Emergency Management pursuant to §10.1-609.1 of the Code of Virginia.	Certain monitoring equipment on dams owned by Soil and Water Conservation Districts is maintained and tested by VDEM pursuant to the Code of Virginia. The amendment allows the testing carried out by VDEM to be sufficient to meet testing requirements as to this equipment.
4VAC50-20-175	Subdivision G(1) required a notification chart to be developed that showed who should be notified in the event of an emergency and that contained contact information for those parties.	A descriptive list of persons to be contacted in the event of an emergency has been added to the subdivision. This list includes the dam owner or manager, state and local emergency management officials, local	Public comment expressed the concern that the general language used by the proposed regulations could imply that the dam owner was responsible for contacting all downstream

	The types of parties to be included was not specified.	police or sheriffs departments, and the dam owner's engineer. In addition, it is required that the notification chart identify the process by which downstream property owners will be notified, and what party is responsible for that notification.	residents, which could be difficult in situations where many individuals reside downstream of a dam. The amendments clarify that the dam owner may rely on other agencies for such notifications, so long as several primary agencies are notified of an emergency situation and the owner's Emergency Action Plan demonstrates that a process is in place to achieve notification of those downstream.
4VAC50-20-175	Subdivision G(7) required that all parties assigned responsibilities under an Emergency Action Plan to sign the Plan to acknowledge receipt of a copy.	The requirement for all other parties to sign the Emergency Action Plan has been replaced with a certification by the dam owner that all other parties have received a copy of the Plan.	Several local governments expressed an unwillingness to sign Emergency Action Plans during the public comment period, citing liability concerns. As was evident from the language of the proposed regulations, the true intent of the subdivision was to prove that parties had received a copy of the Emergency Action Plan. The amendment allows for this certification while alleviating the concerns raised in the public comment period.
4VAC50-20-177	Subsection A specified that an Emergency Preparedness Plan form "will be" available from the Department of Conservation and Recreation	Subsection A has been amended to specify that a form "is" available from the Department	A form is available from the Department.
4VAC50-20-180	Subsection B required that a licensed professional engineer provide full time monitoring of all construction or alteration activities.	The requirement that monitoring be full time has been removed.	Public comment expressed the feeling that full time monitoring of all activities by a license professional engineer is not necessary.
4VAC50-20-190	It was specified that any owner aggrieved by the action or inaction of the director of the department or the board could demand a formal hearing.	The section has been amended to specify that an aggrieved owner may demand an informal fact finding proceeding, and that a formal hearing may only be granted with the consent of the Board.	Informal fact finding proceedings are the preferred method for the review and resolution of matters by an administrative agency. They are less burdensome and less costly for all parties involved. Should a formal hearing truly be necessary, such a hearing can be held with the

			consent of the board. Owners wishing to do so may appeal the outcome of either an informal fact finding proceeding or a formal hearing to circuit court.
4VAC50-20-260	Subsection B specified that vegetated earth or an unlined emergency spillway may be approved when it can be demonstrated that it will pass the spillway design flood without jeopardizing the safety of the impounding structure.	Language has been added to indicate that the allowance of overtopping of a structure not designed to permit overtopping would be an example of an event that jeopardizes the safety of the impounding structure.	The amendment clarifies that overtopping is an event that jeopardizes the safety of a dam, except for those dams designed to permit overtopping (i.e., roller compacted concrete structures).
4VAC50-20-280	The proposed regulations required that all new dams include a device to permit draining of the dam within a reasonable period of time, as determined by the dam owner's engineer. The engineer's determination was subject to the approval of the director.	The need for the director's approval of the engineer's determination has been removed. Additionally, a requirement that existing drains be kept operational and that existing dams without drains be retrofitted where practicable has been added.	Public comments requested that all dams be required to include draining mechanisms. While this is not believed to be practicable for all existing dams, it is agreed that it should be accomplished where practicable. The director's approval of the engineer's determination as to the size of a drain is unnecessary, as the department approves all plans for new dams prior to their construction.
4VAC50-20-290	The proposed regulations required that components of a dam be replaced in keeping with the design and planned life of the dam.	A clarification was added that components of a dam should be maintained or replaced in keeping with the design and planned life of the dam.	Components of a dam may be in need of maintenance, not replacement. The amendment clarifies the intent of the section.
4VAC50-20-320	Subdivision 5 specified that the design procedures, manuals, and criteria used by the United States Federal Agency Regulatory Commission may be utilized.	The language of the subdivision has been corrected to specify that the agency cited is the United States Federal Energy Regulatory Commission.	The amendment corrects an error in the proposed regulations.
4VAC50-20-330	The proposed regulations permitted documents used by the Federal Emergency Management Agency to be utilized as reference sources.	Manuals, guidance, and forms provided by the Department of Conservation and Recreation have been added as acceptable references in subsection B.	Public comment pointed out that the regulations should clarify that Department-issued guidance may be used as a reference.
4VAC50-20-350	Subsection B specified that fees should be submitted to Dam Safety Receipts Control, P.O. Box 10150, Richmond, Virginia 23240.	The address for the submission of fees has been changed to Division of Finance, Accounts Payable, 203 Governor Street, 4th Floor, Richmond, Virginia 23219.	The amendment corrects the address for the submission of fees.
4VAC50-20-	The proposed regulations	Low hazard impounding	The fee structure contained

360	specified that dams owned by Soil and Water Conservation Districts were exempt from the fees imposed by Part VI of the regulations.	structures explicitly exempt from fees pursuant to section 51 of the regulations have also been exempted from paying fees and language to that effect has been added to this section. It has also been clarified that the exemptions provided by the section apply to the fees imposed by "this part" (fees), rather than "Part VI".	in the proposed regulations has been reviewed following receipt of public comment. It has been decided to exempt certain low hazard dams from fee requirements.
4VAC50-20-380	Fees for Regular Operation and Maintenance Certificates were $1,500 for a High Hazard dam, $1,000 for a Significant Hazard dam, and $600 for a Low Hazard dam.	The fee for a High Hazard dam has been reduced to $600, the fee for a Significant Hazard dam has been reduced to $600, and the fee for a low hazard dam (other than those exempted from fees) has been reduced to $300. Additionally, it is specified that the fee for the extension of a Regular Operation and Maintenance Certificate is $250 per year or portion thereof.	The fee structure contained in the proposed regulations has been reviewed following the receipt of public comment and it was determined that fees should be reduced. Additionally, the proposed regulations did not specify a fee for an extension of a certificate.
4VAC50-20-390	Fees for a Conditional Operation and Maintenance Certificate or for the extension of a Conditional Operation and Maintenance Certificate were $1,000 for a two year certificate, $750 for a 1.5 year certificate, $500 for a one year certificate, and $250 for a six month certificate.	The fee for a certificate for more than one year but no more than two years has been reduced to $300, the fee for a certificate for one year or less has been reduced to $150, and the fee for an extension has been set at $250 per year or portion thereof. Additionally, a provision that specified that credits toward a Regular Operation and Maintenance Certificate based on the unused portion of a Conditional Certificate could only be provided to the nearest six-month interval has been removed. Credits may now be provided for any unused portion.	The fee structure contained in the proposed regulations has been reviewed following the receipt of public comment and it was determined that fees should be reduced. In order to encourage conditional certificate holders to make required repairs and upgrades to their dams, the fee for an extension of a conditional certificate is set at a level slightly higher than that of the original certificate.
4VAC50-20-400	The fee for reviewing an incremental analysis was set at $225, with a $45 fee for any resubmittal.	The fee for review of an incremental analysis has been removed, although authority for the department to charge costs for any necessary outside expertise on a review has been retained.	It was determined that in normal cases, the work associated with reviewing an incremental analysis does not require an additional fee. Extraordinary cases may require the hiring of an outside consultant, thus the authority for the department to charge costs (with the agreement of the dam owner) has been retained for use in such cases.

Public comment

Please summarize all comments received during the public comment period following the publication of the proposed stage, and provide the agency response. If no comment was received, please so indicate.

Public Comment Overview

Public Hearings

Five public hearings were held across the state on the following dates and at the following locations:

Date	Location	# Spoke	# Present (minus staff)
October 4, 2007	Roanoke, Virginia	3	18
October 9, 2007	Hampton, Virginia	3	7
October 10, 2007	Richmond, Virginia	1	12
October 11, 2007	Verona, Virginia	5	6
October 16, 2007	Manassas, Virginia	6	16

In total, 59 people (minus staff) attended the public hearings and 18 comments were received. One individual spoke at 3 hearings [thus 16 individuals commented].

Summary of Public Comments Received

During the 60-day public comment period, 40 written comments were received through emails, letters, faxes, or through the Virginia Town Hall. When the input received from the written comments and those from the five hearings are combined, the Department heard from 49 different individuals during the process. The comments received represented a diverse group of stakeholders.

The comments received can generally be broken into two groups.
The first are those that were primarily technical in nature. Examples of these would be that:

1) The regulations should include definitions for terms such as “probable loss of life”, “may cause loss of life”, “no expected loss of life”, “planned land-use”, “major roadways”, and “secondary roadways”
2) As the terms “dam” and “impounding structure” are utilized throughout the regulations clarify that they mean the same thing
3) Specify that EAP exercises for multiple dams may be held in combination when the same parties are involved
4) Change the required frequency for table top exercises from once every 3 years to once every permit cycle (6 years)
5) Clarify language to allow emergency notifications to use systems such as reverse 911
6) Clarify that routine maintenance does not require an alteration permit

These and many of the other technical comments received were addressed.

The second group of comments were those that expressed general concerns such as:

1) Designing to the PMF is an "extreme and improbable" standard
2) Older dams should be grandfathered or treated differently (new versus existing)
3) The fiscal analysis under-represented the true costs of the regulatory changes
4) The regulations need to embody a risk analysis process by which economic impacts of repairs may be weighed against the potential loss of life and property (the public safety that will be achieved via the repairs required)
5) State funding for dam repairs is necessary to accompany the regulations
6) Responsibility for dam repairs should also be placed on those that choose to build or reside in inundation zones
7) Class IV dams should not be held to the same standards as others (SDF, fees, EAP requirements, etc.)
8) Hazard classification should be based on threat to life and property and should not be based on the size of the dam
9) Fees contained in the proposed regulations were too high

As to the general concerns raised, and as has been reflected in the final regulations, the Department suggests that:

1) The use of the PMF for high hazard dams is a reasonable standard to protect public safety as PMF storms have and are likely to occur in Virginia.
2) All dams should be treated the same under the regulations regardless of age (whether they are new or existing).
3) Our fiscal analysis was based on reasonable and verifiable cost estimates and calculation procedures as was substantiated by the Department of Planning and Budget.
4) It has consistently been the Board's position that loss of one life is the risk potential standard by which public safety should be measured throughout the regulations.
5) The Commonwealth is making efforts to capitalize its Dam Safety, Flood Protection and Prevention Assistance Fund and has made its first loans awards. The biennial budget includes $600,000 per year in additional deposits to the Fund.
6) Although the regulations cannot control development within dam break inundation zones, the Agency successfully worked with Delegate Sherwood during the 2008 General Assembly to address the issue through House Bill 837 [Chapter 491 of the 2008 Virginia Acts of Assembly]. Once effective, the bill will provide localities with additional planning and zoning authorities related to dam break inundation zones, require developers to contribute to the costs of upgrades necessitated by their developments, and provide for additional notification opportunities for property owners downstream of dams.

The Department did recognize that:

1) Class IV dams could be handled as a special subset of the low hazard category. Within the low hazard category, certain dams that are determined that upon a failure would cause no expected loss of human life and no economic damage to any property except property owned by the impounding structure owner will have reduced requirements per a new Section 51.

2) Hazard classification should be based on threat to life and property and should not be based on the size of the dam. As such, the size categories within the hazard potential classes were removed.
3) Applications fees should be modified and have reduced the total costs by approximately 60%.

Comments received are as follows:

#	Commenter	Comment	Agency response
1	Sidney O. Dewberry (Dewberry & Davis, LLC)	The regulatory changes concerning permitting and reporting requirements, emergency action plan development and clarification of terminology are much needed enhancements to the regulations. In particular, the updated criteria for development of emergency action plans will go a long way towards increasing safety for persons and property located within potential dam break inundation zones.	The changes made concerning permitting and reporting requirements, emergency action plan development and clarification of terminology are intended to enhance the Dam Safety program to help ensure public safety and provide clarity and predictability for the regulated community.
2	Sidney O. Dewberry (Dewberry & Davis, LLC)	We understand and appreciate the notion that in the interest of public safety there should be no distinction between existing or new dams when it comes to design criteria. While it is difficult to argue against this position from a public safety standpoint, the implication is that funding should not be a factor when it comes to public safety. However, funding is usually a factor which must be considered alongside risk when making decisions concerning rehabilitation of the nation's infrastructure. Upgrading dams to meet current design standards can often be cost prohibitive and in some cases unwarranted if a significant improvement in public safety is not achieved.	It is recognized that upgrades and repairs to dams are often very expensive. The Dam Safety program, however, is tasked with ensuring the safe construction, operation and maintenance of the Commonwealth's dams through implementation of the Board's regulations. The changes made in the final regulations are intended to minimize the costs associated with upgrades to dams to the extent possible while ensuring that an adequate level of public safety is maintained. The changes made to the regulations additionally include the availability of an incremental damage analysis to all dams. This analysis allows the required spillway design flood of a dam to be reduced where it is shown that failure of the dam during a specific flood condition will not cause an additional downstream threat. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006

			General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
3	Sidney O. Dewberry (Dewberry & Davis, LLC)	It is our opinion that engineering judgment and risk assessment should remain a key element in making determinations concerning the need for dam upgrades and in prioritizing/scheduling dam rehabilitation projects and this principle should not be lost with the adoption of new dam safety regulations.	The regulations continue to recognize that engineering judgment is necessary and will be a large factor in determinations to be made. Subsection (E) of section 20 provides that "design, inspection and maintenance of impounding structures shall be conducted utilizing competent, experienced, engineering judgment that takes into consideration factors including but not limited to local topography and meteorological conditions." It is expected that engineering judgment will still be applicable to areas including, but not necessarily limited to, hazard classification (section 40) and incremental analysis (section 52).
4	Sidney O. Dewberry (Dewberry & Davis, LLC)	We therefore encourage the Department of Conservation and Recreation to continue distinguishing between existing and new dams in the regulations and to recognize the need for case by case evaluations of existing dams with respect to meeting current design criteria.	The concept of maintaining a distinction between new and existing dams was discussed extensively with the technical advisory committee (TAC) that assisted with the development of these regulations. The consensus of the TAC was that public safety requires equal treatment of all dams, as safety is influenced by the condition of a dam, and not its age. Secondly, each dam is intended to be evaluated individually for conformance to the regulations. It is recognized that specific characteristics of each dam and varying site conditions will make an individual assessment necessary. In the interest of public safety, however, minimum standards for the design and maintenance of dams are necessary. The regulations are designed to adequately address public safety in all areas of the state while recognizing the need for site-specific determinations.
5	Sidney O. Dewberry (Dewberry & Davis, LLC); Linda and Gerord Korinsky; Raymond and Brenda Crawford; John Martin; Debra Koren; Steven Moore; David	We support further consideration of Alternative 2 as described in the Ad Hoc Dam Safety Study Committee report dated 4-30-05, which outlines an alternative procedure for regulation of existing dams.	Alternative 2, which was an alternative matrix for the required spillway design flood for dams, was discussed extensively by the technical advisory committee (TAC) that assisted with the development of the regulations. A subcommittee of the TAC met to discuss this concept specifically. After that

	Goins; Bruce Synder; James and Julie McComb; William B. Lipscomb; Mary Lipscomb; Nathan Pope; Norman W. Richards; Franklin Chamberlain		subcommittee meeting, and a discussion of the full TAC, it was agreed that allowing considerations not related to the design and operation of the dam to influence the required spillway design standard would not be protective of public safety. Rather than Alternative 2, the regulations permit the spillway design requirement for a dam to be reduced in cases where it can be shown that failure of the dam would not pose an additional downstream threat. This incremental analysis is contained in section 52. It is believed that this provision will allow reductions in spillway design requirements where engineering data can show that the reductions do not come at the cost of public safety.
6	Mark Fendig (Luminaire Technologies, Inc.)	I can tell you from experience that the small dam owner will have a hard time getting even a quote from any of the engineering firms. I feel Dam Safety is out of touch with the high costs of engineering firms now.	It is recognized that engineering work associated with the requirements of the regulations will have costs. The only way to ensure that dams are constructed, operated, and maintained in a way that adequately protects public safety, however, is by conducting engineering analysis that demonstrates actual conditions.
7	Mark Fendig (Luminaire Technologies, Inc.)	I suggest that the existing Class 4 dams that have already been issued an Operation and Maintenance Certificate should not have to pay any fees to maintain (renew) the Certificate unless they were constructed on or after 2001 when Dam Safety lowered the dam height requirements that removed their exempt status.	New section 51 has been added to the regulations in order to address certain low hazard dams; many of these dams are currently Class IV dams. The new section specifies that no certification or permit fee is applicable to a low hazard dam covered by the section.
8	Mark Fendig (Luminaire Technologies, Inc.)	I suggest that DCR Dam Safety should exempt any dam from an Operating Certificate and any fees if the dam is built and being used in conjunction with any in stream mining operation that is regulated by DMME.	Certain dams subject to regulation by the Department of Mines, Minerals, and Energy are specifically exempt from the regulations pursuant to section 10.1-604 of the Code of Virginia. The regulations recognize this in section 50. Being exempt from the regulations, these dams would likewise not be subject to the fees established. For dams that are subject to the regulations, fees have been established pursuant to the authority granted to the board by section 10.1-613.5 of the Code of Virginia. These fees are intended to cover the cost of a small portion of the

			administration of the Dam Safety program and have been amended and reduced from the amounts contained in the proposed regulations. All of these dams influence that program's workload, and there is no reason for exempting certain classes beyond those specifically exempted by the Code.
9	Mark Fendig (Luminaire Technologies, Inc.)	I also suggest DCR Dam Safety offer existing dam owners who have paid the required fees for an Operation and Maintenance Certificate not be required to pay any additional fees for having an alteration permit issued for the purpose of on-going dam maintenance and renewal work that may be required to keep the Operation and Maintenance Certificate in place.	The regulations do not contain a fee for alteration permits.
10	Ray Scher	The new Dam Safety Regulations should be the least restrictive (minimum) regulations approved by the Board. If anything, I believe the Board may find the need to strengthen (not water down) the proposed regulations to insure the public safety of the citizens of the Commonwealth.	It is recognized and agreed that the regulations need to adequately protect the safety of the Commonwealth's citizens. The proposed regulations seek to maintain a proper level of public safety while imposing the minimum burden necessary on dam owners.
11	Wayne Poyer (Lake Holiday)	100% PMP for SDF represents an extreme solution defined by the most improbable circumstances. To enforce that standard of compliance while cognizant of the unanswered financial questions is, in our view, not practical.	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). Financial needs of dam owners are recognized. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.

12	Wayne Poyer (Lake Holiday)	The likelihood of ever experiencing a PMP storm centered over the watersheds of existing dams like Lake Holiday is so remote that a reduced level of precipitation should be considered based upon an analysis of storm events that have occurred in the state of Virginia. The risks associated with a "sunny day" dam failure are not zero, and therefore, the risks of overtopping existing dams should be reasonable, not zero.	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). As to non-flood events, the regulations require that impounding structures be constructed according to one of several sets of criteria contained in section 320. The regulations also contain requirements related to design and maintenance of impounding structures and require inspections by a professional engineer at intervals between two and six years depending on the hazard classification of the impounding structure. These requirements aim to provide protection from sunny day dam failures.
13	Wayne Poyer (Lake Holiday)	The financial burden that will be placed upon all dam operators is extraordinary, perhaps beyond the capabilities of most public and private operators, and is central to compliance at Lake Holiday and all those impacted.	Financial needs of dam owners are recognized. The Board is tasked by the Code of Virginia to maintain regulations that ensure the safe construction, operation, and maintenance of Virginia's dams. The regulations seek to accomplish this in a way that imposes as small a burden as possible on dam owners. Additionally, adjustments to Table 1 of section 50 from the proposed regulations have reduced the costs associated with the regulations. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.

14	Wayne Poyer (Lake Holiday)	Dam Safety regulations that are not in step with the facility to finance the same reflect a standard that begs non-compliance. To impose these regulations at the state level and not address a means to achieve them does not represent an effective set of policies to achieve a agreeably desired goals.	Financial needs of dam owners are recognized. The Board is tasked by the Code of Virginia to maintain regulations that ensure the safe construction, operation, and maintenance of Virginia's dams. The regulations seek to accomplish this in a way that imposes as small a burden as possible on dam owners. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
15	Wayne Poyer (Lake Holiday)	Contingencies need to be built into the policy that requires the legislature to concurrently provide for funding for the legislation already in place for long term financing for the legislation already in place for long term financing and financial grants.	The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
16	Wayne Poyer (Lake Holiday)	A state-wide cooperative program needs to be incorporated and implemented that minimizes the engineering and construction costs.	The Board's regulatory authority does not extend to regulation of the costs of engineering and construction related to dams. The Department does maintain a list of engineers and engineering firms that have expressed interest in working with dam owners in order to assist dam owners with securing engineering services.
17	Linda and Gerord Korinsky; Raymond and Brenda Crawford; John Martin; Debra Koren; Steven Moore; David Goins; Mark Fendig (Luminaire Technologies, Inc.); Bruce Synder; James and Julie McComb; William B.	I am not in favor of removing Classification IV from the regulations. These small dams, that have no impact on anyone but the owners, should not be subjected to the expense of a certified engineer.	New section 51 has been added to the regulations; this section contains special provisions for certain low hazard dams, many of which are Class IV dams. While a professional engineer would be required to classify the dam as qualifying for the provisions of the new section initially, no dam break inundation zone map would be required, nor would subsequent inspections of the dam need to be completed by an engineer so long as circumstances at the

	Lipscomb; Mary Lipscomb; Nathan Pope; Norman W. Richards; Franklin Chamberlain		dam remain unchanged.
18	Ellen and Phil Winter	These regulations should not be enacted until similar levels of responsibility are placed on both dam owners and those who choose to build or reside in inundation zones.	The Board's regulatory authority does not extend to regulation of downstream property owners. The Department is aware of the issue of downstream development affecting the hazard classification and associated spillway design requirements of dams. To that end, the Department has been recently working with numerous stakeholders on possible legislative solutions to this problem, and as a result, House Bill 837 has been introduced during this year's General Assembly session. This bill would create responsibilities for developers of downstream development to contribute to upgrade costs, grant greater planning and zoning responsibilities to localities, and create notification responsibilities related to dam break inundation zones.
19	Ellen and Phil Winter	All key words and terms should be defined at the beginning of the regulations and used consistently throughout. As currently written, several key words or terms are undefined and different words or terms are used to describe the same, or similar, concepts including: impounding structure, dam, agricultural purpose dams (4VAC50-20-30), dam break inundation zone (4VAC50-20-30), failure of a dam (4VAC50-20-30), spillway (4VAC50-20-30), dam break analysis (4VAC50-20-40), spillway design flood (4VAC50-20-260), slopes and crest of embankments (4VAC50-20-105), influence factors (4VAC50-20-105), impounding structure breach (4VAC50-20-58), and flood wave travel times (4VAC50-20-54).	--The terms "dam" and "impounding structure" were intended to have the same meaning for purposes of the regulation. To ensure clarity, it has been specified in the definition of "impounding structure" that the term is synonymous with the term "dam." --Engineers preparing maps will utilize various flood waves in preparing inundation maps and it is believed that this term should remain flexible for application. --The term "dam breach", when used in the regulations, has been changed to "dam failure" to enhance clarity. --The term "spillway" is defined by section 30 and would include both primary and emergency spillways by the terms of the definition. --The spillway design flood of an impounding structure is determined by use of Table 1, contained in section 50. --The language of section 54(F)(2) has been amended to remove the language concerning "flood wave travel times" discussed in the comment.
20	Ellen and Phil Winter	In 4VAC50-20-40, please insert the words "notwithstanding reasonable precautions taken by those in its inundation zone" in paragraph B, B.1,	The language used in section 40 pertains to the methods by which an impounding structure is classified into one of the three hazard potential classifications.

		B.2 and B.3. As currently written, Paragraph B places full responsibility for the safety of others and their properties in inundation zones on the owners of existing impounding structures and therefore is unduly discriminatory and inequitable.	This language does not purport to impose responsibility for response to emergency situations on any party. While it is acknowledged that all individuals should be prepared to respond to a known threat from an impounding structure, the addition of language addressing downstream parties specifically would not aid the purpose of the section.
21	Ellen and Phil Winter	In paragraph B in 4VAC50-20-40, the word "human" should be added before the word "life".	The word "human" has been added before the word "life" in section 40 to add clarity.
22	Ellen and Phil Winter	Clarification is needed of the terms "probable loss of life", "may cause loss of life", and "no expected loss of life" in 4VAC50-20-40. Absent clear definitions, hazard classification of an impounding structure will vary with the personal opinions of the classifiers as to what these terms mean.	Definitions for the terms "probable loss of life", "may cause loss of life", and "no expected loss of life" have been added to enhance clarity.
23	Ellen and Phil Winter	The concept of a spillway's performance "at a minimum to safely pass" a SDF should be clarified. Does this mean that the spillway capacity is sufficient to prevent overtopping of the impounding structure, including overtopping by wave peaks, but not by the average water/material level, during the Table 1 specified flood?	Generally, "safely pass" means that overtopping of the impounding structure embankment will not occur. However, certain impounding structure designs (e.g., roller-compacted concrete, concrete gravity, etc.) will permit overtopping to occur safely. Flexibility has been left in the regulations to allow for these designs.
24	Ellen and Phil Winter	The appropriate spillway design flood is not determined by Table 1, but through consideration of the factors described in 4VAC50-20-52 on incremental damage assessment.	The appropriate spillway design flood is determined through application of Table 1. The incremental analysis found in section 52 may be applied to further analyze appropriate spillway design and reduce the required spillway design flood where such reduction would not increase threats to public safety. The analysis, however, is not mandatory, and the starting point for determining the spillway design flood requirement is Table 1.
25	Ellen and Phil Winter	Concerning Table 1 entries for the SDF, does historical Virginia meteorological and other applicable records on which PMFs are based, confirm that .50 and .75 PMFs significantly exceed the 100-YR flood in all geographic areas of the State, without exception? If not, SDFs for owners of low hazard potential impounding structures will be held, without good reason, to a higher standard than owners of significant and high hazard structures.	The 100-year flood event is far exceeded by the .50 and .75 PMF in all areas of the state, without exception.

26	Ellen and Phil Winter	The primary impetus for these regulations is the need to minimize risks to human life and property; Table 1 entries are illogical and should be changed. For example, despite the lower risk to life and property described in 4VAC50-20-40, significant hazard potential structures with sizes greater than or equal to 50,000 acre feet are held to the same SDF standard as all high hazard structures. The size subcategories shown for significant and low hazard structures, in fact, are not determinative of potential risk to life and property and therefore not of significant importance in establishing a SDF.	Table 1 has been revised to contain uniform spillway design flood requirements for impounding structures of the same hazard classification. It no longer distinguishes among impounding structures based on their size.
27	Ellen and Phil Winter	In 4VAC50-20-52, clarification is needed as to what constitutes an "unreasonable hazard to life and property".	This portion of section 52 has been rewritten and no longer contains the language, "unreasonable hazard to life and property."
28	Ellen and Phil Winter	In 4VAC50-20-52, clarification is needed concerning the "limiting flood condition for incremental damages" and the "evaluation" that is envisioned of this condition. On what basis should engineers conclude the various incremental damages associated with differing SDFs and spillway designs are acceptable or unacceptable?	Section 52 has been amended to include the "Rule of 7s", which specifies that an additional downstream threat is presumed to exist when water depths exceed two feet or when the product of the water depth (in feet) and the average floodplain flow velocity (in feet per second) is greater than zero.
29	Ellen and Phil Winter	In 4VAC50-20-54 paragraph A, the "inundation zone" described in this paragraph as "not further constituting a hazard to downstream life or property" appears inconsistent with that found to constitute an unacceptable threat in 4VAC50-20-52 paragraph C.	The language contained in section 52 and that contained in section 54 address different subjects. The level specified by section 52 is related to spillway design flood requirements and hazard levels. While section 54 does have an impact on hazard classification, the particular language cited by the comment is related to the overall impact of a flood condition, without regard to hazard.
30	Randolph W. Bartlett (Fairfax County)	Considering the fact that some of the estimates provided by dam owners indicate repairs may be in the $5-$15 million range per dam, there seems to be inadequate financial support from the state to ensure a successful program.	The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
31	Randolph W. Bartlett (Fairfax County)	The fact that the regulations establish fees to help defray the state's cost of administering the program further shifts	Fees have been established pursuant to the authority granted to the board by section 10.1-613.5 of the Code of

		the financial burden to local governments and private owners.	Virginia. These fees are intended to cover the cost of a small portion of the administration of the Dam Safety program, and have been purposely set at levels that are believed to be as minimal as possible. In fact, the fee amounts provided for by the regulations have been further reduced from the values contained in the proposed regulations.
32	Randolph W. Bartlett (Fairfax County)	Reviewing the estimates in the economic impact analysis, and based on our experiences, we believe that the individual costs for preparing emergency action plans and performing dam breach and incremental analysis are underestimated. Also, based on the preliminary estimates we have received for one of our facilities, we believe that the estimates used in the analysis for repairs to existing facilities are low. If this is correct, the economic impact could be considerably greater than the $250 million cited in the economic impact analysis.	Requirements in the regulations that would cause the need for upgrades to impounding structures have been amended and it is believed that this amendment will result in significant cost savings from the estimated cost of the regulations that were initially proposed by the Board. The estimates contained in the economic analysis for the proposed regulations were based on a national study on dam repair and upgrade costs 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". It was specifically recognized in the "significant qualifiers" portion of the economic analysis that these costs may have risen since the time of that report and may continue to rise over time. Other cost information, including dam break inundation zone mapping and incremental analysis, were developed through receiving estimates from various engineering firms that perform work on impounding structures in Virginia.
33	Randolph W. Bartlett (Fairfax County)	We support the recommendation of using high, low, and significant as the hazard classification which better conforms to current federal terminology.	Table 1 of section 50 of the regulations has been amended to provide three hazard potential classification categories instead of the four categories contained in the current regulations. This brings the regulations into conformance with the standards used by federal agencies and many other states.
34	Randolph W. Bartlett (Fairfax County)	However, we are concerned that the process may be too conservative because if one structure is damaged, the dam will be classified as high hazard. This could result in large expenditures with minimal reduction in loss.	The regulations do not require that an impounding structure be classified as high hazard simply because one structure may be damaged. Rather, the regulations classify impounding structures as high, significant, or low hazard potential based on levels of

			economic damages (including damages to structures) and threats to human life. A loss of one human life, unlike a single structure, is sufficient to classify an impounding structure as high hazard. The technical advisory committee (TAC) that assisted with the development of the regulations considered the issue of threat to human life extensively. Following those discussions, it was determined that a loss of one human life was unacceptable, and that the regulations should seek to prevent any such loss.
35	Randolph W. Bartlett (Fairfax County)	Another concern along the same lines is that the classification could change if downstream conditions change. This can have significant impacts if the classifications changed after improvements are designed or implemented.	The Board's regulatory authority does not extend to regulation of downstream property owners. The Department is aware of the issue of downstream development affecting the hazard classification and associated spillway design requirements of dams. To that end, the Department has been recently working with numerous stakeholders on possible legislative solutions to this problem, and as a result, House Bill 837 has been introduced during this year's General Assembly session. This bill would create responsibilities for developers of downstream development to contribute to upgrade costs, grant greater planning and zoning responsibilities to localities, and create notification responsibilities related to dam break inundation zones.
36	Randolph W. Bartlett (Fairfax County); Michael Schaefer (Virginia Municipal Stormwater Association)	We are concerned that the state does not have a current and/or accurate inventory of all dams that require a state permit. It does not appear that the state has been able to contact all of the affected dam owners and inform them of the need to register their dams, or of the requirements in the regulations. We are concerned that many private dam owners are not aware of the proposed regulatory changes and may not have the resources to comply with the regulations as proposed. Considering that some of these dams were constructed as stormwater management facilities required by the MS4 permits, the removal or breaching of such facilities may not be an immediate option. We believe there needs to be a much greater effort to complete the inventory and provide outreach prior to	Legislation passed in 2002 significantly increased the number of impounding structures required to be regulated by the Dam Safety Program. Since that time, the Department has been working to update Virginia's dam inventory and bring all regulated impounding structures under certificate. Much of this effort has been, and will continue to be, education and outreach to dam owners.

		the adoption of more stringent regulations.	
37	Randolph W. Bartlett (Fairfax County)	Specific guidelines should be provided on conducting an incremental analysis. Although the regulations provide more clarity than previously, approval of these analyses still appears to be subjective and without clear criteria. Considering the financial and other impacts to the community if spillway improvements are required to existing dams, or if existing facilities must be removed from service, we believe there should be clearer and more objective criteria.	It is believed that an allowance for engineering judgment in incremental analysis is important. Therefore, the incremental analysis contained in section 52 has been left flexible.
38	Randolph W. Bartlett (Fairfax County)	We believe that the requirement that emergency action plans be exercised does not provide sufficient information as to what is required to meet permit conditions. If a full table top is required utilizing the communities' Emergency Management Agency, the local emergency managers are not sufficiently resourced for all EAPs to be exercised. The regulations are unclear as to if we are required to do an exercise for each facility, or if each owner of a facility is required to do an exercise, or is each community required to do an exercise? Nor do the regulations define who is required to participate in these exercises. This requirement in itself can become quite expensive.	Section 175 of the regulations requires that exercises be conducted for each impounding structure. The language of that section was modified to allow for these exercises to be conducted in combination with exercises for other impounding structures when the involved parties would be the same. Emergency action plan exercises are to be conducted by the dam owner and, to the extent practicable, state and local emergency management agencies (such as the Virginia Department of Emergency Management, local police departments, fire departments, and other emergency services agencies). As explained by the definition of the term "tabletop exercise" in section 30 of the regulations, these exercises are intended to be informal with minimum stress involved. It is not intended for these exercises to impose an undue burden on impounding structure owners.
39	Randolph W. Bartlett (Fairfax County)	We have a very specific concern that the regulations previously required that earthen embankments be inspected and be cleared of vegetation in order to protect the integrity of the embankment. One section of the proposed regulations requires trees be removed within a distance of 25 feet from the embankment and abutments of the dam. We believe that keeping the embankment and the emergency spillway area clear is appropriate; however we do not believe it is appropriate to specify clearing "within a distance of 25 feet". Many of the stormwater management facilities in	Section 10.1-609.2 of the Code of Virginia contains the requirements related to the growth of trees and other woody vegetation on impounding structures and also mandates that such vegetation be removed within a distance of 25 feet of the toe and abutments of the impounding structure. The Board does not have regulatory discretion to vary this requirement.

		urban areas require landscaping, not only for aesthetics, but as part of the treatment process.	
40	Randolph W. Bartlett (Fairfax County);	Our greatest concern is the financial resources that will be required to bring all spillways up to the new standards. There has been considerable discussion about the cost benefit of the proposed regulations. While we agree that we need to do everything practicable to protect life and property, we also need to determine which financial investments provide the greatest level of protection to the community. We believe the analysis needs to consider the extent of damage and risk that is already occurring during the Probable Maximum Precipitation (PMP) storm, and then consider the additional risk posed by a dam breach. The financial resources required to reconstruct a spillway to reduce the potential of a dam breach during a PMP storm may have a greater return if used to provide flood protection for communities at risk of flooding during the 100 year or less storm.	The Board is charged by the Dam Safety Act, § 10.1-604 et seq. of the Code of Virginia, with adopting regulations that ensure the safe design, construction, operation and maintenance of Virginia's impounding structures. To that end, the Board must be guided by its mandate and adopt the regulations believed necessary to protect public safety from dam failures.
41	Randolph W. Bartlett (Fairfax County)	In summary, we believe there should be a more detailed analysis of the actual cost of the program and that there needs to be a better program for state assistance. Simply changing the regulations without providing resources and assistance will not provide for a safer environment and spending funds for a minor reduction of water surface during a PMP storm will likely divert funding from correction of more routine flooding issues.	Financial needs of dam owners are recognized. The Board is tasked by the Code of Virginia to maintain regulations that ensure the safe construction, operation, and maintenance of Virginia's dams. The regulations seek to accomplish this in a way that imposes as small a burden as possible on dam owners. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
42	John A. Bricker (Natural Resources Conservation Service); Charles E. Horn (Headwaters Soil and Water	In Section 4VAC50-20-30, the definition of "alteration" includes" conducting necessary structural repairs or structural maintenance:. This type of work is performed on an as-needed and recurring basis with most dams. The	Language has been added to section 30 and section 80, which deals with alteration permits, to specifically state that "structural maintenance" (for which a permit is required) does not include routine maintenance. This would

	Conservation District)	inclusion of repairs and maintenance into the alteration definition will create unnecessary and cumbersome administrative processes for dam owners and the department as per requirements contained in 4VAC50-20-80. Does this type of work really need to be permitted and/or regulated? We suggest that this wording be deleted from the definition.	effectively clarify that no permit is required for routine maintenance. Overall, the term "alteration" is defined in section 10.1-604 of the Code of Virginia and the Board does not have the authority to vary that definition. As observed by the new language, however, the definition is limited to repairs or maintenance related to the structural integrity of the impounding structure, and is not intended to extend to repairs and maintenance not related to the impounding structure's structural integrity. Section 80 of the regulations additionally provides examples of activities that do require alteration permits.
43	John A. Bricker (Natural Resources Conservation Service)	Sections 4VAC50-20-40 and 4VAC50-20-50 deal with hazard classification and performance standards of impounding structures. We fully agree that impounding structures should be classified based on the potential loss of human life or damage to the property of others downstream. However, the proposed regulations do not make a clear and distinct connection between the hazard classification and the proposed performance standards contained in Table 1. As proposed, the height of the dam, and not only the hazard class, determines the design criteria. If a structure is properly classified according to the potential threat to life and/or property, the height of the dam should not really change or alter the design and performance standards for the structure. Public safety considerations regarding the risk of failure of a significant hazard dam should be the same regardless of structure height. The proposed regulations imply that the public safety considerations for a large significant hazard structure are the same as for a high hazard structure. Based on the hazard class definitions, the public safety considerations are not the same. This is conflicting and confusing information. We suggest that the design standards should correlate with the hazard classification regardless of the height of the dam.	Table 1 of section 50 has been amended to contain uniform spillway design flood requirements for impounding structures in each hazard potential category. It no longer distinguishes among impounding structures based on their size.
44	John A. Bricker (Natural Resources	Section 4VAC50-20-177 requires an emergency preparedness plan for low	New section 51 has been added to the regulations; this section contains special

	Conservation Service)	hazard dams. This seems to be a requirement for an administrative process without much merit. If the structure is properly classified as a low hazard dam, a failure of the dam would create no expected threat to loss of life and only minimal economic damage to downstream properties. We suggest that this section could be eliminated altogether and thereby relieve some of the administrative burdens on dam owners.	provisions for certain low hazard dams, many of which are current Class IV dams that cause no expected loss of life and no economic damage to anyone but the owner. This new section does remove the Emergency Preparedness Plan requirement for those dams. For other low hazard dams that may cause economic damage to others, the Emergency Preparedness Plan requirement has been maintained. Still, the plan is designed to be compiled by the dam owner with limited to no expense involved.
45	Dr. Peter G. Rainey	Capacity should be determined by inflow hydrographs. The computation of an inflow hydrograph is a function of the watershed characteristics, while an outflow hydrograph is both function of inflow and dam design, including reservoir characteristics, dam height, spillway characteristics, and gate(s) operating procedures. The setting of SDF design based on the outcome of that design is circular logic. "The owner's engineer must develop PMF hydrographs for 6-, 12-, and 24-hour durations. The hydrograph that creates the largest peak ~~ouflow~~ inflow is to be used to determine capacity for nonfailure and failure analysis".	Inflow does not necessarily equate with peak pool elevation. In contrast, peak pool elevation will equate with peak outflow. The technical advisory committee that assisted with the development of the regulations discussed this topic and it was determined that peak outflow was the appropriate criteria.
46	David Campbell (Schnabel Engineering)	Dam failures can indeed worsen the consequences of extreme flood events. Where the failure of an impounding structure due to inadequate spillway capacity can be shown to significantly increase the severity and/or extent of flood impacts, the provision of sufficient spillway capacity for passing a probable maximum flood will ultimately prevent injuries and the loss of additional lives, and prevent significant additional damages to property.	It is agreed that the PMF is an appropriate impounding structure design criteria and that designing impounding structures to this standard can help prevent additional loss of life and property, even in extreme flood events. 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).

47	David Campbell (Schnabel Engineering)	If the extent of additional flooding resulting from a dam failure can be shown to be small for extreme flood events, then the Department has provided a process whereby lesser spillway flood passage criteria can be applied (proposed incremental damage assessment: 4VAC50-20-52).	The incremental analysis, which is found in section 52 of the regulations, is the method by which a lesser spillway design flood requirement can be utilized for an impounding structure where it can be shown that designing to a lesser spillway design flood will not unacceptably increase hazards to life and property.
48	David Campbell (Schnabel Engineering)	The presence of an emergency response document, together with a commitment to undertaking drills and exercises, is not sufficient to prevent or mitigate disaster. However, preparedness in knowing available options and opportunities in advance and having simulated extreme events will, by definition, make critical knowledge more readily available, enhance communications, define action plans to be implemented in the absence of available communications, and improve decision making and decision support under stressful, rapid-response conditions. Prepared owners and responders do indeed derive purposeful benefits, even under extreme circumstances.	It is agreed that Emergency Action Plans (EAPs) can help mitigate and prevent losses of life and property in emergency situations. Requirements for EAPs for high and significant hazard impounding structures is contained in section 175 of the regulations, while requirements for Emergency Preparedness Plans for low hazard impounding structures (which are lesser than full EAPs due to the lesser threat posed by low hazard structures) are contained in section 177.
49	David Henderson (Hayes, Seay, Mattern & Mattern, Inc.); William Monroe (Augusta County Service Authority)	The term "planned land-use" is used several places in the regulations. Is this intended to be total build out condition in accordance with a valid comprehensive plan? Could this term be defined?	To increase clarity, a definition of "planned land use" has been added to the definitions section (section 30) of the regulations. The current definition is "…land use that has been approved by a locality or included in a master land use plan by a locality, such as in a locality's comprehensive land use plan."
50	David Henderson (Hayes, Seay, Mattern & Mattern, Inc.)	4VAC50-20-54 B. Extending inundation mapping to a point downstream where the water surface elevation level of the SDF with a failure is within 1-foot of the water surface elevation level of the SDF without a failure appears excessive. Extending the mapping to a point where the two conditions converge to within 2 to 3 feet should be adequate for the extreme events that are being considered (PMF to 100-year).	It is believed that mapping to one foot increments is appropriate. This threshold also maintains consistency with the Commonwealth's floodplain program.
51	David Henderson (Hayes, Seay, Mattern & Mattern, Inc.)	4VAC50-20-54 B. Is it the intent of the regulations to require mapping to include profiles and cross sections in addition to the plan of the inundation mapping? If so, what is the purpose of providing profiles and cross sections on the inundation mapping? The modeling	It is not the intent of the regulations to require cross sections in mapping. Language contained in section 54 indicating that cross sections are required has been removed. Water surface profiles are required to show the depth of inundation.

		input data will include profile and cross section information, but the inundation mapping should not be required to include cross sections and profiles.	
52	David Henderson (Hayes, Seay, Mattern & Mattern, Inc.)	4VAC50-20-40 C. Requires a dam break analysis by an engineer to support the appropriate hazard category, yet 4VAC50-20-54 E, states that low hazard potential impounding structures do not require an engineer to prepare the inundation mapping. This appears to be a contradiction as the evaluation to support a dam category of "low hazard" must be supported by a dam break analysis that includes the downstream inundation areas. A professional engineer should be required for all inundation mapping, irregardless of the dam category.	As amended, the regulations now require all dam break inundation zone mapping for hazard potential determinations to be prepared by a licensed professional engineer, except for those dams exempted from that requirement by new section 51 (which still requires an engineer's certification).
53	David Henderson (Hayes, Seay, Mattern & Mattern, Inc.)	4VAC50-20-54 F.2. States that a note must be placed on all maps that includes the statement "mapping of flooded areas and flood wave travel times are approximate. Timing and extent of actual inundation may differ from information presented on this map". This is the only place in the regulations that mentions flood wave travel time on inundation mapping. The regulations need more direction as to what is desired and required for flood wave travel time on the inundation mapping.	The language of section 54(F)(2) has been amended to remove the language discussed in the comment.
54	David Henderson (Hayes, Seay, Mattern & Mattern, Inc.)	The economic impact statement asserts the cost for inundation mapping is anticipated to average $16,417 each. This is too low to prepare the level of detail that appears to be required by the regulations. (1)The inundation mapping must extend until the increase is water surface elevation level during the SDF with a failure is less than 1-foot greater than the water surface elevation level of a SDF without a failure. This requirement will require long reaches to be mapped. (2)Detailed survey is required, but the regulations do not specify what constitutes a detailed survey. Does the survey effort required for inundation mapping need to meet the FEMA requirements for Flood Insurance Study mapping? (3)Each structure located within or near the inundation zone will need to be located and its first floor	Cost estimates for inundation zone mapping were developed by obtaining estimates from engineering firms that perform work on impounding structures across the Commonwealth. It is believed that the information contained in the economic impact analysis is accurate. It is recognized that mapping and other costs can vary across different types of impounding structures due to factors such as a broad range of sizes, inundation zones, watersheds, and downstream affected properties.

		elevation shot. (4)The cost to prepare the inundation mapping must reflect the time and care that must be taken in their preparation due to their critical use in emergency situations.	
55	David Henderson (Hayes, Seay, Mattern & Mattern, Inc.)	The regulations do not provide any guidance as to the study survey requirements. Inundation mapping is similar to the FEMA flood insurance studies. Should FEMA survey requirements for flood insurance studies mapping development be required?	The regulations have been drafted to allow flexibility for an engineer to use the best available information. It is not intended that FEMA flood insurance study survey requirements be required.
56	David Henderson (Hayes, Seay, Mattern & Mattern, Inc.)	4VAC50-20-175 G.7. Dam owners are not equipped for rapid notification of downstream residents in the event of an emergency. This notification is usually performed by the locality's EMS. What will the Emergency Action Plan process be if the locality refuses to sign the plan accepting any responsibility for notification?	All emergency action plan requirements are the responsibility of the impounding structure owner. In the event that arrangements for notifications by a locality cannot be made, this includes arranging for the notification of downstream residents in an emergency situation. It is the Department's experience, however, that localities are willing to offer whatever assistance they are able to in an emergency situation.
57	David Henderson (Hayes, Seay, Mattern & Mattern, Inc.)	A lot of problems with inadequate operation and maintenance of dams in the past has occurred due to lack of financial resources on the part of dam owners. Has any consideration been made to require prospective new dam owners to show adequate financial ability and commitment (similar to that required by sanitary landfill owners) to properly operate and maintain a dam after construction; prior to issuing a permit to construct?	The Board's regulatory authority over construction of impounding structures is limited to the actual construction of the impoundment. The Board does not have regulatory authority over the financial abilities of dam owners. All impounding structures, including those newly constructed, must obtain necessary permits and fulfill the requirements of an operation and maintenance certificate once constructed.
58	Charles E. Horn (Headwaters Soil and Water Conservation District)	4VAC50-20-54. Dam Break Inundation Zone Mapping: The proposed requirement for dam break inundation zone mapping is expected to cost the district $131,336 using the estimated per dam cost in the economic analysis. Conservation Districts are subdivisions of state government and have no revenue powers to raise funds. We question our ability to comply with this.	It is recognized that dam break inundation zone mapping requirements may impose additional costs on dam owners. The maps, however, are integral to making accurate determinations of hazard potential classification, and in developing and maintaining an accurate emergency action plan, both extremely important considerations in ensuring the safe design and operation of an impounding structure. As such, all dam owners are treated equally, whether private or public, including Soil and Water Conservation Districts.
59	Charles E. Horn (Headwaters Soil and Water Conservation District)	The Headwaters Soil and Water Conservation District acknowledges that the proposed regulations have the potential to improve public safety.	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 section 20(A).
60	Charles E. Horn (Headwaters Soil and Water Conservation District)	4VAC50-20-105 B. In all places where "owner" is used, the wording should be changed to read the owner or owner's certifying engineer shall…	The owner is the sole party responsible for the operation and maintenance of their impounding structure. This responsibility cannot be delegated to a professional engineer. It is important that all submittals for certificates come directly from the owner of the impounding structure.
61	Charles E. Horn (Headwaters Soil and Water Conservation District)	4VAC50-20-175 E. Headwaters Soil and Water Conservation District acknowledges the benefit of drills and table top exercises for emergency planning. However, to conduct a drill each year for eleven (11) dams will strain the resources to the breaking point of not only the district but each of the paid and volunteer fire and rescue organizations that would need to participate annually. The three year requirement for table top exercises, while less often, will still tax the resources of all participating. We suggest that a table top exercise be conducted once per permit duration (no more than once every two years for conditional and once every six years for regular permits). We also suggest that only one drill per permit duration be required (no more than once every two years for conditional and once every six years for regular permits). We further believe that one drill dealing with the emergency personnel should meet the requirement of all the dams in that department's response area. In our situation a drill per dam means five drills for just one fire department and will lead to the "cry-wolf syndrome".	The drills required by section 175 test, develop, or maintain skills in an emergency response procedure. During a drill, participants perform an in-house exercise to verify telephone numbers and other means of communication along with the owner's response. This in-house exercise is intended to ensure that each EAP remains up to date and that those having responsibilities under it are able to carry out their duties. A drill is not intended to be an onerous requirement or to require excessive effort on the part of third parties. The language of section 175 was modified to allow emergency action plan exercises to be conducted in combination with exercises for other impounding structures when the involved parties would be the same. Emergency action plan exercises are to be conducted by the dam owner and, to the extent practicable, state and local emergency management agencies (such as the Virginia Department of Emergency Management, local police departments, fire departments, and other emergency services agencies). As explained by the definition of the term "tabletop exercise" in section 30 of the regulations, these exercises are intended to be informal with minimum stress involved. It is not intended for these exercises to impose an undue burden on impounding structure owners.
62	Charles E. Horn (Headwaters Soil and Water Conservation District)	4VAC50-20-175 F. The existing monitoring and warning equipment in our district is part of the National Weather Service Integrated Flood Observing and Warning System (IFLOWS). The maintenance is handled by the Virginia Department of	The language of section 175(F) has been amended to recognize the maintenance responsibilities of the Virginia Department of Emergency Management for IFLOWS installed on Soil and Water Conservation District-owned dams and to specify that testing of such systems

		Emergency Services. They have decided to reduce their testing from twice a year to once a year. The actual ownership of the IFLOWS has not been determined. The Headwaters Soil and Water Conservation District questions how this regulation can hold it responsible for testing of equipment owned and serviced by a different agency.	may be performed at the intervals set by VDEM.
63	Charles E. Horn (Headwaters Soil and Water Conservation District)	4VAC50-20-180 D. The term "damage" is open to considerable interpretation and should be further defined to exclude minor erosion that can be fixed and seeded immediately without powered equipment.	Defining "damage" to exclude minor erosion would likewise be subject to considerable interpretation. All erosion in an emergency spillway should be addressed properly. Should erosion be minor and able to be handled during normal maintenance, it is anticipated that a professional engineer could perform necessary inspections and sanction such work without a large amount of time, review, or expense.
64	Edward L. Priestas (Henrico County)	The proposed changes place a considerable burden on current owners of dams to upgrade their facilities. While there is provision for owners with facilities operating under current operation and maintenance certificates, there does not appear to be provision for owners of facilities not currently in compliance.	For impounding structures that do not receive a delayed effective date, the Board will continue to utilize the existing conditional certificate process, which emphasizes progress by an impounding structure owner toward coming into compliance with regulatory standards. This process allows the particular situation of each impounding structure to be considered independently and for achievable timelines to be set.
65	Edward L. Priestas (Henrico County)	It is understood that facilities not yet regulated but which exceed the threshold for regulation must first apply for a conditional operation and maintenance certificate. The timeline for the conditional operation and maintenance certificate is for a maximum term of two years.	Impounding structures that are not currently under regulation but meet all regulatory requirements do not need to initially apply for a conditional certificate, but may instead apply for a Regular Operation and Maintenance Certificate. Impounding structures that do not meet the requirements of the regulations must apply for a Conditional Operation and Maintenance Certificate. The maximum term of these certificates is two years, as noted by the comment.
66	Edward L. Priestas (Henrico County)	4VAC50-20-155 states that the Board may extend a Conditional Permit provided that the owner is proceeding with the necessary corrective actions. There does not appear to be any maximum length of time that extensions may be granted. In light of the extensive costs involved in upgrading some facilities to meet the	The Board examines applications for extensions to conditional operation and maintenance certificates on a case-by-case basis. In cases where only an extension of a term of months is necessary to complete necessary upgrades and repairs, the Board limits its extension accordingly. It is believed that extensions should continue to be

		new standards is it not reasonable to state that owners making progress toward correcting deficiencies may request an extension of the current conditional certificate on one year increments? The total number of extensions not to exceed the time allowed owners holding current operation and maintenance certificates to comply with the new standards based on the hazard potential classification.	examined on a case-by-case basis and that placing an established time on each extension without consideration of actual site conditions would be inappropriate.
67	Brooks Smith (Hunton and Williams on behalf of the Virginia Manufacturers Association)	The definition of "impounding structure" could be interpreted to encompass such impoundments [captive industrial waste impoundments] ("used to retain or store waters or other materials"). We do not believe that such an interpretation would be appropriate and we ask that DCR clarify in the final regulations that captive industrial waste impoundments are not covered.	Unless an impounding structure fits within one of several exceptions to the definition of "impounding structure" contained within the Dam Safety Act (§10.1-604 et seq.), all impounding structures that are at least 25 feet in height and create a maximum impoundment capacity of 15 acre feet or greater, or that are at least 6 feet in height and create a maximum impoundment capacity of 50 acre feet or greater are required to be regulated by the Board. The Board does not have the authority to create additional exceptions to this Code requirement.
68	Geoffrey L. Cowan (Dewberry & Davis. LLC)	I recommend that wherever possible specific technical criteria be removed from the regulations and place in guidance documents. One reason for this is that once specific technical criteria becomes part of a regulation, the ability to amend or possibly even "correct" the criteria, based on newer or more technically accurate information, becomes difficult to accomplish in a timely fashion.	Due to the requirements of administrative law in Virginia, any criteria wished to be enforced must be placed in regulations that undergo the Administrative Process Act procedures for adoption. While placing technical criteria in guidance documents would allow for easier updating and correction, it would also have the undesired effect of making the use of such criteria unenforceable.
69	Geoffrey L. Cowan (Dewberry & Davis. LLC)	It is recommended that the threshold criteria related to incremental damage analysis (IDA) be placed in a guidance document providing detailed technical IDA procedures rather than appearing in the regulations. One good example of the approach is the guidance document for performing incremental damage analysis found in the "Ohio Critical Flood Guidelines". The threshold criteria and technical guidance provided in this document are clearly presented an in keeping with industry standards and I recommend that something similar be considered for Virginia.	Due to the requirements of administrative law in Virginia, any criteria wished to be enforced must be placed in regulations which undergo the Administrative Process Act procedures for adoption. While placing technical criteria in guidance documents would allow for easier updating and correction, it would also have the undesired effect of making the use of such criteria unenforceable. It is believed that the components of the incremental analysis which need the force of regulation have been included in the regulations. This does not prevent the issuance of guidance in the future to further assist with explaining the

			application of the incremental analysis.
70	Geoffrey L. Cowan (Dewberry & Davis. LLC)	Whether or not the IDA threshold criteria presented in section 4VAC50-20-52 C is removed from the proposed regulations, the thresholds should relate to the incremental increase in water surface elevation and velocity associated with the non-failure and failure scenarios for a particular design storm, which is in keeping with the IDA guidelines presented in both the "Federal Guidelines for Dam Safety: Selecting and Accommodating Inflow Design Floods for Dam, FEMA 94" and the "Ohio Critical Flood Guidelines". The current wording in the proposed regulations does not clearly refer to the incremental increase in flood depth or velocity.	The language contained in section 52, which has been amended, now contains the "Rule of 7s", which specifies that an additional downstream threat is presumed to exist when water depths exceed two feet or when the product of the water depth (in feet) and the average floodplain flow velocity (in feet per second) is greater than seven. This specification is believed to be adequate for inclusion in the regulations. This does not prevent the issuance of guidance in the future to further assist with explaining the application of the requirements of the regulation.
71	Geoffrey L. Cowan (Dewberry & Davis. LLC)	It is recommended that specific technical criteria related to development of spillway design floods, such as the required storm durations proposed in section 4VAC50-20-50D, be removed from the regulations and placed in a guidance document concerning SDF development.	Due to the requirements of administrative law in Virginia, any criteria wished to be enforced must be placed in regulations which undergo the Administrative Process Act procedures for adoption. While placing technical criteria in guidance documents would allow for easier updating and correction, it would also have the undesired effect of making the use of such criteria unenforceable. It is believed that the components of spillway design flood development that need the force of regulation have been included in the regulations. This does not prevent the issuance of guidance in the future to further assist with explaining the application of the requirements of the regulation.
72	Irwin Stanton	It is my opinion that the regulation of high risk impoundments focuses too much on dealing with PMF induced impacts at the expense of addressing preventative measures for the so called "sunny day breach". As one whose family and friends live in an inundation zone, I am more concerned about he sudden breach than what would happen as a result of a PMF event. The meteorological event triggering a PMF will provide warning that coupled with an emergency notification system, will likely give me time to move to higher ground before all avenues of travel are flooded.	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).

			As to non-flood events, the regulations require that impounding structures be constructed according to one of several sets of criteria contained in section 320. The regulations also contain requirements related to design and maintenance of impounding structures and require inspections by a professional engineer at intervals between two and six years depending on the hazard classification of the impounding structure. These requirements aim to provide protection from sunny day dam failures.
73	Irwin Stanton	One should remember that most modes of transportation have storm systems designed for 10 to 100 year events at best.	The Board's mandate pursuant to the Dam Safety Act (§10.1-604 et seq.) is to adopt regulations that provide for the safe design, construction, operation, and maintenance of Virginia's impounding structures. While other types of infrastructure may be designed to criteria different than that required for impounding structures, the Board must set forth the requirements that it believes are necessary to carry out its mandate pursuant to the law.
74	Irwin Stanton	It is my opinion that dams whose sudden failure would cause loss of life should be closely monitored for changes in piezometric surface within the dam or indication of sediment bearing leakage that would indicated piping/erosion within the dam.	It is recognized that piezometric monitoring of an impounding structure is desirable and the Board supports its use in appropriate cases. Such monitoring, however, is impracticable for many dam owners, and especially for those owning impounding structures that were constructed without the installation of this technology. Therefore, piezometric monitoring has not been included in the regulations as a requirement. The Board's mandate pursuant to the Dam Safety Act (§10.1-604 et seq. of the Code of Virginia) is to enact regulations that ensure the safe design, construction, operation, and maintenance of Virginia's impounding structures. The regulations have been developed in pursuit of this mandate, and all requirements believed necessary to accomplish this goal have been included.
75	Irwin Stanton	The ability of an impoundment to withstand runoff from a PMF provides no assurance against a sunny day collapse.	With respect to failures under non-flood conditions, or "sunny day dam failures", the regulations require that impounding structures be constructed according to one of several sets of criteria contained in section 320. The regulations also contain requirements related to design and maintenance of impounding

			structures and require inspections by a professional engineer at intervals between two and six years depending on the hazard classification of the impounding structure. These requirements aim to provide protection from sunny day dam failures.
76	Irwin Stanton	I believe that owners of high or significant risk class impoundments not only have the ability and financial resources to provide monitoring, but an obligation to their neighbors in the inundation zone to provide a means to detect possible sudden failure and prevent that failure by having the ability to lower the impoundment level until repairs are made to the structure. It is respectively suggested that monitoring of high and significant risk impoundments be expanded to include active monitoring within the structure, an emergency response plan if a problem is detected and require a means to lower the level of the impoundment until the structure is further evaluated and repaired.	Requirements for monitoring within an impounding structure, such as piezometric monitoring, are discussed in comment 74 above. The regulations do require routine inspections by both the dam owner and, where appropriate, a professional engineer. Should deficiencies be identified, the regulations require that the owner take actions specified under their required emergency action plan or emergency preparedness plan, and that the deficiencies be addressed as necessary.
77	Louis Panebianco	Why not help Virginians bring the existing dams into compliance before imposing additional burdens?	The Board is charged by the Dam Safety Act, § 10.1-604 et seq. of the Code of Virginia, to adopt regulations that ensure the safe design, construction, operation and maintenance of Virginia's impounding structures. In conducting this revision to the regulations, which were last reviewed comprehensively in 1989, the Board must be guided by its mandate. While it is recognized that many impounding structures still need additional work to become compliant with current requirements, waiting to adopt proper standards will do little more than cause these structures to undergo two upgrades instead of one (one in order to meet current standards, and then another to meet revised standards at a later date should the standard be increased). This would increase the overall burden to impounding structure owners. To assist impounding structure owners with compliance, the Department continues to seek additional staffing in order to provide additional outreach and guidance. The Department also continues to advocate for funding for the

			Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
78	Louis Panebianco	Our country's highway system does not even have to meet your proposed standards.	The Board's mandate pursuant to the Dam Safety Act (§10.1-604 et seq.) is to adopt regulations that provide for the safe design, construction, operation, and maintenance of Virginia's impounding structures. While other types of infrastructure, including highways, may be designed to criteria different than that required for impounding structures, the Board must set forth the requirements that it believes are necessary to carry out its mandate pursuant to the law.
79	William Monroe (Augusta County Service Authority)	4VAC50-20-52. As written this appears to only apply to existing dams that do not need any maintenance – eventually, all dams will be required to perform some maintenance at which time it appears they would have to expand to the SDF without exception.	Section 52 has been amended to remove the language that is cited by the comment. The intent of the regulations, as well as the revised language, is for the incremental analysis to be available to all impounding structure owners. Other requirements for maintenance, inspections, and emergency action plans are contained in other sections of the regulations.
80	William Monroe (Augusta County Service Authority)	4VAC50-20-52. There are references in each of these sections related to water depths where the limits are 1 to 2 feet and velocities within 3 feet per second. With the level of accuracy associated with some mapping sources and the modeling software, these tolerances may be very difficult to meet with confidence.	The language contained in section 52, which has been amended, now contains the "Rule of 7s", which specifies that an additional downstream threat is presumed to exist when water depths exceed two feet or when the product of the water depth (in feet) and the average floodplain flow velocity (in feet per second) is greater than seven. It is believed that the tolerances specified can be met. It is also of note that conducting an incremental analysis is not a requirement of the regulations, but rather an option for the dam owner.
81	William Monroe (Augusta County Service Authority)	4VAC50-20-175. What is expected from the remote sensing equipment tests? If the equipment is maintained by contract under IFLOWS, is this sufficient?	The tests required by section 175 are intended to ensure that remote sensing equipment is functioning as designed so that it works properly at all times. Section 175 has been amended to specify that equipment maintained by the Virginia Department of Emergency Management (VDEM), such as

			IFLOWS, may be tested according to a schedule developed by VDEM.
82	William Monroe (Augusta County Service Authority)	4VAC50-20-175. Keeping track of every individual owner, lessee, etc. takes a significant continuous effort. Using reverse 911 systems would be preferred. The use of cell phones is making efforts more difficult for any process employed.	Section 175 has been amended to clarify that systems such as reverse 911 may be utilized. The dam owner is responsible for developing a notification chart demonstrating how parties affected by a dam failure will be notified; use of reverse 911 is just one method that may be utilized by a local emergency services department to achieve notification of downstream residents, if that responsibility is assigned to the emergency services department.
83	William Monroe (Augusta County Service Authority)	4VAC50-20-175. The owner is made fully responsible for development of the EAP. Will there be feedback from the Department on whether it is deemed to be sufficient?	All emergency action plans are required to be submitted to the Department, both by section 175 and by section 105, which explains how a Regular Operation and Maintenance Certificate is applied for and obtained. The Department will review all EAPs for sufficiency.
84	William Monroe (Augusta County Service Authority)	4VAC50-20-175. Have all state and local officials been made aware of the frequency of meetings associated with the regulatory requirements and can owners expect full cooperation? The number of meetings (when looking at all dams in a locality) could cause a significant strain on staffing at both the state and local level (something of which the owner has no control) creating a potential violation condition for dam owners.	Section 175 of the regulations requires that exercises be conducted for each impounding structure. The language of that section has been modified to allow these exercises to be conducted in combination with exercises for other impounding structures when the involved parties would be the same. Emergency action plan exercises are to be conducted by the dam owner and, to the extent practicable, state and local emergency management agencies (such as the Virginia Department of Emergency Management, local police departments, fire departments, and other emergency services agencies). The absence of a state or local official will not create a violation by the owner if that official's participation is not practicable.
85	William Monroe (Augusta County Service Authority)	4VAC50-20-320. In the past I have had difficulty locating applicable references from the sources listed. Are there specific titles that can be provided by the Department that would assist with locating and identifying appropriate source materials similar to what is done in 4VAC50-20-330?	It is understood the information necessary from the sources listed in section 320 may not be readily apparent without further specification. While the list of reference materials is greater than felt appropriate to be contained within the regulations, the Department is considering issuing guidance or posting to its website further explanatory information regarding these sources.
86	William Monroe (Augusta County Service Authority)	Better define economic impact.	Requirements in the regulations that would cause the need for upgrades to impounding structures have been amended and it is believed that this

			amendment will result in significant cost savings from the estimated cost of the regulations that were initially proposed by the Board. The estimates contained in the economic analysis for the proposed regulations were based on a national study on dam repair and upgrade costs 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". It was specifically recognized in the "significant qualifiers" portion of the economic analysis that these costs may have risen since the time of that report and may continue to rise over time. Other cost information, including dam break inundation zone mapping and incremental analysis, were developed through receiving estimates from various engineering firms that perform work on impounding structures in Virginia.
87	Michael Moon (City of Manassas)	It is understood that many of the changes that are proposed reflect changes in the industry at both the State and federal level that will better identify the risks inherently associated with dam construction. The requirements to put into place emergency action plan development and clarification of terminology along with the requirement to perform dam break analysis and notify persons and property located within potential dam break inundation zones are much needed enhancements to the regulations.	It is agreed that Emergency Action Plan development and implementation will enhance public safety. It is also agreed that the performance of dam break analyses will provide for accurate hazard potential classifications and supply the owner and others with information necessary to define the area that will be affecting by the failure of the impounding structure.
88	Michael Moon (City of Manassas)	The current regulations rely on the judgment of competent and experienced professional engineers to evaluate the dam classification in the context of various factors that apply to each dam design, including risk that should weigh heavily into dam safety evaluations. The revised Table 1 takes this discretionary aspect out of the process which will not allow the flexibility that has been used in the past successfully throughout the Commonwealth.	While Table 1 has been revised to set minimum requirements for spillway design, the regulations continue to recognize that engineering judgment is necessary and will be a large factor in determinations to be made. Subsection (E) of section 20 provides that "design, inspection and maintenance of impounding structures shall be conducted utilizing competent, experienced, engineering judgment that takes into consideration factors including but not limited to local topography and

			meteorological conditions." It is expected that engineering judgment will still be applicable to areas including, but not necessarily limited to, hazard classification (section 40) and incremental analysis (section 52).
89	Michael Moon (City of Manassas)	The second issue in reference to the implementation strategy is concerning from a cost standpoint and does not mirror similar initiatives in other areas of infrastructure improvement. The State regulates building construction under the Uniform Statewide Building Code (USBC), which requires an owner to maintain a building in conformance to the Code that existed at the time of permit issuance. The owner does not have to update to current codes until such time that he performs new work on the structure. This is to protect the owner from costly upgrades every time the Code changes. Another public example is when roads are constructed they have to meet the Code in existence at the time. Every road cannot be updated to new standards every time a new design criteria is placed into effect because this would be cost prohibitive.	It is understood that other types of infrastructure are not required to upgrade each time that standards are changed. In the case of impounding structures, however, public safety, which is the sole concern of the regulations, is directly impacted by the standards in place. To "grandfather" existing structures would ignore the reality that public safety is not dependent upon the age of an impounding structure, but rather on its design and condition. The technical advisory committee that assisted with the development of the regulations considered the issue of setting different standards for old and new impounding structures, including grandfathering of existing structures. Following this discussion, it was determined that public safety interests mandated the equal treatment of all impounding structures. In order to allow for impounding structures that are in compliance with the Board's regulations to have time necessary to upgrade to the new standards contained in these regulations related to spillway design flood, section 125 does contain a delayed effective date provision that would permit these upgrades to be phased in over an 8 to 11 year period.
90	Michael Moon (City of Manassas)	It must be recognized that funding is usually a factor which must be considered alongside risk when making decisions concerning rehabilitation of the nation's infrastructure. Upgrading dams to meet current design standards can often be cost prohibitive and in some cases unwarranted if a significant improvement in public safety is not achieved.	It is recognized that upgrades and repairs to dams are often very expensive. The Dam Safety program, however, is tasked with ensuring the safe construction, operation and maintenance of the Commonwealth's dams through implementation of the Board's regulations. The changes made to the regulations are intended to minimize the costs associated with upgrades to dams to the extent possible while ensuring that an adequate level of public safety is maintained. The changes made to the regulations additionally include the availability of an

			incremental damage analysis (section 52) to all dams. This analysis allows the required spillway design of a dam to be reduced where it is shown that failure of the dam during a specific flood condition will not cause an additional downstream threat. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
91	Michael Moon (City of Manassas)	The City would like to see a distinction in the regulations for new dams and existing dams and to see the current regulations stay in place under Section 130 that provides for exemptions for dams that were constructed prior to July 1, 1982 that do not pose and unreasonable hazard to life and property.	To "grandfather" existing structures would ignore the reality that public safety is not dependent upon the age of an impounding structure, but rather on its design and condition. The technical advisory committee that assisted with the development of the regulations considered the issue of setting different standards for old and new impounding structures, including grandfathering of existing structures. Following this discussion, it was determined that public safety interests mandated the equal treatment of all impounding structures. In order to allow for impounding structures that are in compliance with the Board's regulations to have time necessary to upgrade to the new standards contained in these regulations related to spillway design flood, section 125 does contain a delayed effective date provision that would permit these upgrades to be phased in over an 8 to 11 year period. Additionally, the language that was previously contained in section 130 of the regulations has been relocated to section 52, which contains the incremental damage analysis. This new section would allow the old section 130 process to be applied to all dams, including those constructed prior to 1982.

92	Michael Moon (City of Manassas)	The City's dam is one of only nineteen (19) Class 1 risk dams in the state whose sole purpose is to operate as a water supply reservoir. We are being requested to spend almost $10 million in funds to achieve a full PMF storm design. This will result in higher water rates for our residents and businesses. If the dam regulations are not changed to provide relief to the City it is requested that the Board works closely with the Legislature and Governor on a funding strategy to assist localities that are impacted adversely by adhering to the new regulations.	The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
93	Ralph Hollm	Treating old and new dams alike may help regulators but that would be completely contrary to the well established safety criteria used in the rules and regulations applicable to everything from highways to homes.	It is understood that other types of infrastructure are not required to upgrade each time that standards are changed. In the case of impounding structures, however, public safety, which is the sole concern of the regulations, is directly impacted by the standards in place. To "grandfather" existing structures would ignore the reality that public safety is not dependent upon the age of an impounding structure, but rather on its design and condition. The technical advisory committee that assisted with the development of the regulations considered the issue of setting different standards for old and new impounding structures, including grandfathering of existing structures. Following this discussion, it was determined that public safety interests mandated the equal treatment of all impounding structures. In order to allow for impounding structures that are in compliance with the Board's regulations to have time necessary to upgrade to the new standards contained in these regulations related to spillway design flood, section 125 does contain a delayed effective date provision that would permit these upgrades to be phased in over an 8 to 11 year period.
94	Ralph Hollm	It is most discouraging to see the deletion of the safe, flexible and sensible features of 4VAC50-20-50 b: "The establishment in this chapter of rigid design flood criteria or standards is not intended. Safety must be evaluated in the light of peculiarities and local conditions for each	While Table 1 has been revised to set minimum requirements for spillway design, the regulations continue to recognize that engineering judgment is necessary and will be a large factor in determinations to be made. Subsection (E) of section 20 provides that "design, inspection and maintenance of

		impounding structure and in recognition of the many factors involved, some of which may not be precisely known. Such can only be done by competent, experienced engineering judgment, which the values in Table 1 are intended to supplement, not supplant."	impounding structures shall be conducted utilizing competent, experienced, engineering judgment that takes into consideration factors including but not limited to local topography and meteorological conditions." It is expected that engineering judgment will still be applicable to areas including, but not necessarily limited to, hazard classification (section 40) and incremental analysis (section 52).
95	John Taylor (Crab Orchard Creek Reservoir)	I would like you to consider that, if you do put in an application fee, and if it's a good application and it progresses satisfactorily that it would be a one-time fee, rather than implemented on a yearly basis.	The fees contained in the regulations are due on a cyclical basis. The amounts of the fees, however, have been reduced from the amounts contained in the proposed regulations. It is believed that the fee levels set will be manageable for dam owners.
96	John Taylor (Crab Orchard Creek Reservoir)	I would request that while maintaining the requirement for demonstrating safe structures that the requirement for costly completion models not be mandated, but used only when required and that language be included to encourage the Board to consider less costly alternatives when these are available.	It is believed that the information required to be developed by the regulations, including impounding structure inundation zone maps and computer routings, is the least costly method reasonably available to accurately classify and design impounding structures.
97	John Taylor (Crab Orchard Creek Reservoir)	The classification of the Class I or the Class II or the significant situation seems to unreasonably propose regulations that again are going to require computer generated information. I think in many cases less costly alternatives are available.	It is believed that the information required to be developed by the regulations, including impounding structure inundation zone maps and computer routings, is the least costly method reasonably available to accurately classify and design impounding structures.
98	John Taylor (Crab Orchard Creek Reservoir)	If computer generated information is required, that is going to exclude some of the "normal" professional engineers as listed on the department's schedule as far as being available to help dam owners. The only people with access to these extremely expensive programs are people like Thompson and Litton and Dewberry and Davis.	It is believed that the computer programs necessary to mapping will be able to be obtained by all interested engineers. HEC-1, which is one program capable of performing such work, is available for free from the U.S. Army Corps of Engineers.
99	John Taylor (Crab Orchard Creek Reservoir)	I would respectfully request than consideration be given to some type of individual income tax relief to be included in these changes. I have discussed the deductibility of these expenses as my property of 320 acres is an actively managed tree farm. Unless the legislature would recognize the mandatory nature of these expenses, that the only way of recouping this expense would be to sell the property.	The Board's regulatory authority under the Dam Safety Act, § 10.1-604 et seq. of the Code of Virginia, is limited to ensuring the safe design, construction, operation, and maintenance of Virginia's impounding structures. The Board does not have authority over tax matters or the deductibility of costs incurred in dam maintenance, which is an issue that would have to be considered by the General Assembly.
100	John Taylor (Crab	I note with some alarm the requirement	An analysis without a dam failure is

	Orchard Creek Reservoir)	for a dam owner to provide analysis of the situation where a dam passes the PMF without failure and to document the local conditions pertaining at the time. Passage of the PMF (following redesign of the spillway) would mean the dam had performed one of its purposes successfully (i.e. mitigation and assisting with flood control), but there would still exist clearly a considerable local problem. It would be of great concern locally but it is surely not fair to impose the cost of detailed hydrological analysis of the total drainage on an individual dam owner?	necessary, for comparative purposes, to determine the impact of a dam failure during a flood event. This information is needed to properly determine hazard classification and to plan for emergencies at the impounding structure. It may also be utilized by a dam owner in conducting an incremental damage analysis. As it is the impounding structure that is capturing water that will be released by a failure, it is equitable to require the owner to develop the data necessary to demonstrate the impact of a failure.
101	Gregario Vigilar (GKY & Associates, Inc.)	Inundation mapping. The location of the end of inundation mapping should be indicated where the water surface elevation of the dam break inundation zone (Is this based on a PMF or on the spillway design flood?) and the water surface elevation of the spillway design flood for a non-dam failure event converge within one foot of each other. What is the purpose of comparing the two inundation zones? Is it to assess the difference in flooding when the dam holds and when it fails? If so, for a valid comparison, we need to use the same flooding event in both cases, e.g., if you're designing the spillway for a 0.9 PMF, then the dam break analysis should be performed also for a 0.9PMF. Is this correct?	Section 54 of the regulations, as amended, contains requirements for mapping of both the PMF and the spillway design flood of the dam in order to allow for comparisons. Mapping of the spillway design flood and the PMF, as well as mapping of a dam with and without a failure, is necessary for comparative purposes to determine the impact of a dam failure during a flood event. This information is needed to properly determine hazard classification and to plan for emergencies at the impounding structure. It may also be utilized by a dam owner in conducting an incremental damage analysis.
102	Gregario Vigilar (GKY & Associates, Inc.)	Incremental damage assessment (4VAC50-20-52). 5. The applicant demonstrates...that the impounding structure...does not pose an unreasonable hazard to life and property. How do you define "unreasonable hazard"? If the dam is not able to handle the PMF without overtopping, does it pose an unreasonable hazard?	Section 52 has been revised and now adopts the “Rule of 7s”, which specifies that an additional downstream threat to persons or property is presumed to exist when water depths exceed two feet or when the product of the water depth (in feet) and the average floodplain flow velocity (in feet per second) is greater than seven.
103	Gregario Vigilar (GKY & Associates, Inc.)	Can you still proceed with IDA using a smaller design flood, if the existing structure does not pass the PMF in the first place? If it doesn't pass the PMF, do we redesign the spillway so that it does? Is it only after developing an adequate PMF design that we can proceed with IDA?	The incremental analysis may be performed if the existing structure will not pass the PMF; however, the engineer will still need to determine that a reduced spillway design will not present an additional downstream threat.
104	Michael Schaefer (Virginia Municipal	The definitions of the three proposed hazard potential incorporate and rely	To increase clarity, a definition of “planned land use” has been added to the

	Stormwater Association)	upon vague standards. For example, the difference between the three classifications may depend upon whether the degree of economic damage in event of dam failure is "serious" (high hazard), "appreciable" (significant hazard) or "minimal" (low hazard). In addition, the proposal requires "planned land use" to be considered when making a hazard classification. VAMSA members are concerned of the potential difficulty of applying these qualitative and fairly subjective standards in practice, particularly given the potentially significant regulatory and cost ramifications of the classification.	definitions section (section 30) of the regulations. The current definition is "…land use that has been approved by a locality or included in a master land use plan by a locality, such as in a locality's comprehensive land use plan." Due to difficulties in establishing a firm threshold statewide and a need to allow for engineering judgment to make determinations on a case-by-case basis, terms relating to levels of economic damage have been left flexible. Other factors to be considered in hazard potential determinations, however, have been given additional definition in section 40 of the regulations. These include "probable loss of life", "may cause loss of life", and "no loss of life expected."
105	Michael Schaefer (Virginia Municipal Stormwater Association)	Section 50: Performance Standards This section revises spillway design standards and eliminates the existing exemption for facilities constructed before July 1982. While VAMSA agrees with the concept of everything practicable to protect life and property, VAMSA is concerned with the financial burden on Virginia localities, and ultimately its citizens, that will be required to bring all spillways up to the proposed standards.	It is recognized that upgrades and repairs to dams are often very expensive. The Dam Safety program, however, is tasked with ensuring the safe construction, operation and maintenance of the Commonwealth's dams through implementation of the Board's regulations. The changes made to the regulations are intended to minimize the costs associated with upgrades to dams to the extent possible while ensuring that an adequate level of public safety is maintained. The changes made to the regulations additionally include the availability of an incremental damage analysis (section 52) to all dams. This analysis allows the required spillway design of a dam to be reduced where it is shown that failure of the dam during a specific flood condition will not cause an additional downstream threat. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan

			round is being conducted between December 1, 2007 and February 1, 2008.
106	Michael Schaefer (Virginia Municipal Stormwater Association)	The Board should also consider the financial burden in the context of the most significant needs of citizens and whether this regulation allocates funds appropriately. With respect to the performance standards, VAMSA recommends that the regulations factor in the extent of damage and risk that is already occurring during the PMF storm, and then consider the additional risk posed by a dam breach. For example, in areas already subject to flooding during say, the 100-year storm, the incremental damage from dam failure may be insignificant compared to the damage inflicted by the storm itself. VAMSA is concerned that the regulation may be too prescriptive, and thereby, direct limited local resources to addressing spillway designs for major storms and interfere with the ability to correct more likely problems.	Section 52 of the regulations contains the incremental damage analysis, which will allow the spillway design flood requirement for an impounding structure to be reduced where it can be shown that a lesser design capacity would not pose an additional downstream threat. This analysis had previously been available only to impounding structures constructed prior to July 1982 but would now be available to structures constructed both pre- and post-1982.
107	Michael Schaefer (Virginia Municipal Stormwater Association)	VAMSA supports the opportunity to conduct an incremental damage assessment and reduce the otherwise applicable SDF, when the result of the assessment supports such a reduction. However, Table 1 specifies minimum threshold or floor below which the SDF may not be reduced, even if justified by an incremental damage assessment. The floor applicable to a given dam is arbitrary. Taking that into account along with the loss of the grandfather clause, for existing dams, VAMSA recommends revising Table 1 and section 50 C and section 52 D to allow reductions in the SDF down to the existing spillway design, when justified by the results of an incremental damage assessment.	Table 1, which is contained in section 50, has been further revised from the proposed regulation. This includes the floor for spillway design reduction. Still, a minimal level has been maintained, as engineering models do not always reflect actual flood conditions and thus a margin of safety needs to be maintained.
108	Michael Schaefer (Virginia Municipal Stormwater Association)	Section 52: Incremental Damage Assessment Subsection C establishes the criteria of water depth greater than two feet and flow velocities greater than three feet per second as an "unacceptable additional downstream threat" that precludes a reduction in SDF performance standard by incremental damage assessment. VAMSA members have expressed the concern that these figures are arbitrary	The criteria contained in the regulations for defining the level of an unacceptable additional downstream threat has been revised to utilize the Rule of Sevens, which is a methodology utilized by many other states that is believed to be an appropriate approach for use in the Commonwealth. Following adoption of these regulations, the Board will develop guidance to

		and should be more flexible. At a minimum, VAMSA recommends inserting the term "generally" in this subsection ("per second shall generally be used to define conditions"). In addition, VAMSA also suggests providing guidelines on conducting an incremental analysis. The guidelines should provide criteria for conducting such analyses.	provide additional technical details not included in the regulations.
109	Michael Schaefer (Virginia Municipal Stormwater Association)	Section 54: Dam Break Analysis. For clarity, in subsection D 3, VAMSA recommends deleting the phrase "dam break", because it addresses a "no failure" scenario.	The phrase, "dam break" has been removed from the provision.
110	Michael Schaefer (Virginia Municipal Stormwater Association)	Section 125: Delayed Effective Date for SDF Requirements. In general and in this specific case, VAMSA supports the concept of phasing in new regulatory requirements on a reasonable schedule taking into account all of the facts and circumstances. From an engineering and construction (i.e., not financial) perspective, VAMSA supports the phase-in period specified in subsection A. VAMSA is concerned that the first sentence of subsection A is punitive in that it would deny a needed phase-in period for new requirements if the owner does not hold a "regular" operations certificate. It is unreasonable to "spring" the new requirements, with no phase-in period, on facilities with "conditional" certificates. As to existing deficiencies, VAMSA does not object to subsection D, but VAMSA recommends revising the first sentence of subsection A to read "currently operating under a Regular or Conditional Operation and Maintenance Certificate."	For impounding structures that do not receive a delayed effective date, the Board will continue to utilize the existing conditional certificate process, which emphasizes progress by an impounding structure owner toward coming into compliance with regulatory standards. This process allows the particular situation of each impounding structure to be considered independently and for achievable timelines to be set.
111	Michael Schaefer (Virginia Municipal Stormwater Association)	Section 160: Growth and Removal of Vegetation. Proposed subsection B would require woody vegetation to not be allowed "within a distance of 25 feet from the toe of the embankment and abutments of the dam." VAMSA supports proper maintenance and requirements to keep embankments and emergency spillway areas clear, but is concerned with the proposed "within a distance of 25 feet" requirement, particularly as this requirement would apply to stormwater management facilities in urban areas. The facilities	Section 10.1-609.2 of the Code of Virginia contains the requirements related to the growth of trees and other woody vegetation on impounding structures and also mandates that such vegetation be removed within a distance of 25 feet of the toe and abutments of the impounding structure. The Board does not have regulatory discretion to vary this requirement.

		typically require landscaping for either aesthetic or water quality purposes, and the twenty-five foot distance requirement may be a greater distance than necessary in these settings for these facilities. VAMSA recommends that the Board amend this provision by inserting at the end of subsection B "except for stormwater management or other facilities in developed areas, where landscaping for water quality, aesthetic or other purposes is allowed within this distance so long as facility integrity is not materially adversely impacted."	
112	Michael Schaefer (Virginia Municipal Stormwater Association)	Section 175: Emergency Action Plans. VAMSA fully supports the concept of emergency preparedness, but is very concerned that the proposed frequency of drills (annually) and tabletop exercises (once every three years) will be an excessive burden on dam owners. Although the scope of these activities is not well defined in the proposal, worthwhile drills and tabletop exercises will entail significant preparations in addition to the time involved with the actual drill or exercise. VAMSA questions whether "state emergency management officials" have the time and resources to participate in all of the tabletop exercises with the owners and facilities across the entire Commonwealth once every three years. Based on discussions with VAMSA members, VAMSA recommends a tabletop exercise frequency of once every six years in conjunction with reissuance of the operations and maintenance certificate.	Section 175 has been amended to require that tabletop exercises be conducted once every six years. Additionally, the language of that section has been modified to allow these exercises to be conducted in combination with exercises for other impounding structures when the involved parties would be the same.
113	Michael Schaefer (Virginia Municipal Stormwater Association)	Section 220: Temporary Repairs Prior to Board Approval. VAMSA supports the proposal to allow dam owners to undertake emergency repairs without prior approval of the Board, because the permitting process is impractical and typically too slow to accommodate the needs of an emergency situation. This comment also applies to subsection 60 B.	Section 220 of the regulations allows for emergency repairs to occur without a permit in order to prevent a failure of the impounding structure. This exception is intended to be used in true emergency situations and the owner must notify the Department of emergency repairs performed within 24 hours and obtain the necessary permit as soon as practicable.
114	Michael Schaefer (Virginia Municipal Stormwater Association)	Section 330: Other Applicable Dam Safety References. This section references two FEMA documents and generally refers to "manuals, guidance and criteria used by FEMA." The	In addition to the two documents specifically referenced, section 330 does refer generally to manuals, guidance, and criteria used by FEMA as potential sources of information for dam owners

		section is vague as to the binding regulatory effect under this Board regulation of the documents that FEMA uses. VAMSA has no objection to listing references, but does object to incorporating federal documents, especially a broad universe of documents used by FEMA, as a binding state regulation. VAMSA recommends clearly indicating that "the reader is referred to relevant manuals, guidance and criteria used by FEMA as potentially helpful reference sources; however, such manuals, guidance and criteria are nonbinding under this regulation."	and their engineers. The information contained in those documents, however, is not intended to be enforced against dam owners; rather, provisions for which enforcement authority is desired are contained in the regulations themselves, or within documents specifically incorporated by reference. It is not believed necessary in this instance to add the language suggested by the comment.
115	Michael Schaefer (Virginia Municipal Stormwater Association)	The economic analysis estimates the repair cost range for dams from $145,000 to $10,080,000. Based on VAMSA members' experience, we believe it is likely that the upgrade costs will exceed this range significantly in some cases. The cost figures do not appear to include the cost for administering the engineering and construction. The combined cost estimate of $24,000 for inundation mapping, emergency action plan development, and incremental damage assessment will support only about 300 hours of consultant time, which appears inadequate for most significant and high hazard dams in the experience of VAMSA members.	Requirements in the regulations that would cause the need for upgrades to impounding structures have been amended and it is believed that this amendment will result in significant cost savings from the estimated cost of the regulations that were initially proposed by the Board. The estimates contained in the economic analysis for the proposed regulations were based on a national study on dam repair and upgrade costs 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". It was specifically recognized in the "significant qualifiers" portion of the economic analysis that these costs may have risen since the time of that report and may continue to rise over time. Other cost information, including dam break inundation zone mapping and incremental analysis, were developed through receiving estimates from various engineering firms that perform work on impounding structures in Virginia.
116	Michael Schaefer (Virginia Municipal Stormwater Association)	If our understanding is correct, the economic impact could be considerably greater than the $250 million cited in the economic impact analysis. More detailed study of these costs should be done with input from dam owners, and that study should be done in advance of adopting the regulations to the extent	Requirements in the regulations that would cause the need for upgrades to impounding structures have been amended and it is believed that this amendment will result in significant cost savings from the estimated cost of the regulations that were initially proposed by the Board.

		that DCR considers cost to be a relevant factor.	The estimates contained in the economic analysis for the proposed regulations were based on a national study on dam repair and upgrade costs 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". It was specifically recognized in the "significant qualifiers" portion of the economic analysis that these costs may have risen since the time of that report and may continue to rise over time. Other cost information, including dam break inundation zone mapping and incremental analysis, were developed through receiving estimates from various engineering firms that perform work on impounding structures in Virginia.
117	Michael Schaefer (Virginia Municipal Stormwater Association)	Disproportionate Impact. The background document states that no locality will bear a disproportionate cost. Since each situation will be different, some localities will no doubt be faced with substantial capital costs. VAMSA respectfully submits that the conclusion of no disproportionate impact is inaccurate.	It is clear that the many localities of the Commonwealth own varying numbers of impounding structures, and that each situation will be different. The point addressed by the statement cited by the comment, however, was whether any locality was treated subjectively different; i.e., whether the regulations specify a different requirement for one area of the state versus other areas, or whether a particular regulatory provision is directed toward a situation occurring in a single locality. In the case of these regulations, while the situations of localities will be very different in many cases, that is merely the product of the quantity and condition of their impounding structures, and not due to the singling out of any locality or group of localities.
118	Timothy A. Mitchell (City of Lynchburg)	The Agency Background Document economic analysis cost estimate of $16,417 for inundation mapping would not support more than 200 hours of consultant time. According to a consultant sued by the City for several other projects, the cost of inundation mapping for a nearby dam with similar downstream characteristics was $60,000. Additionally, we have received aerial survey and contour mapping quotations ranging from	Cost estimates for inundation zone mapping was developed by obtaining estimates from engineering firms that perform work on impounding structures across the Commonwealth. It is believed that the information contained in the economic impact analysis is accurate. It is recognized that mapping and other costs can vary across different types of impounding structures due to factors such as a broad range of sizes, inundation zones, watersheds, and

		$61,000 to $98,750, depending on the desired accuracy.	downstream affected properties.
119	Timothy A. Mitchell (City of Lynchburg)	The Agency Background document states that no locality will bear a disproportionate cost per impounding structure. We do not understand how such a broad statement can be made. The background document repair cost range for dams over 50 feet high is estimated at $5,080,000 to $10,080,000. Without further investigation, it is impossible to determine the actual cost for upgrading Pedlar Dam, but increasing the spillway capacity from 0.23 PMF to 0.75 PMF or PMF as required by the proposed regulations could cost much more than the agency estimate. The agency estimates probably do not account for loss of service of the City's primary source of water during repair, the much higher cost of pumping and chemicals for the alternative raw water source, and administrative costs.	It is clear that the many localities of the Commonwealth own varying numbers of impounding structures, and that each situation will be different. The point addressed by the statement cited by the comment, however, was whether any locality was treated subjectively different; i.e., whether the regulations specify a different requirement for one area of the state versus other areas, or whether a particular regulatory provision is directed toward a situation occurring in a single locality. In the case of these regulations, while the situations of localities will be very different in many cases, that is merely the product of the quantity and condition of their impounding structures, and not due to the singling out of any locality or group of localities. The cost estimates are based on the actual costs of repair and upgrade to impounding structures as a result of the regulations and does not contain data related to alternative water sources or other consequential costs.
120	Timothy A. Mitchell (City of Lynchburg)	During a future 6-year O&M recertification, a dam that previously has been permitted to construct a spillway with capacity less than the designated spillway design flood (SDF) for its hazard classification through an incremental damage assessment (IDA) could be required to upgrade its spillway again if the current IDA shows that homes, buildings, roads, or structures built since the last recertification would require an increased spillway capacity.	It is recognized that future development downstream of an impounding structure can affect the required spillway design flood for that impounding structure, including changing the result of the incremental analysis. Determining which standard to upgrade to in the situation that the incremental analysis is employed is the dam owner's responsibility and decision. Should the owner determine to not improve the spillway to the full PMF, there will always be a possibility of a need for future upgrades.
121	Timothy A. Mitchell (City of Lynchburg)	The only protection from this risk would be for the locality where the dam is located to prohibit building in the PMF dam-break inundation zone, which in itself could create land use issues. For many dam owners, where mandatory zoning prohibiting building in the PMF dam-break inundation zone is not feasible, or where the dam is in another jurisdiction, the only reasonable course of action would be to design the spillway for PMF based on	The Board's regulatory authority does not extend to regulation of downstream property owners. The Department is aware of the issue of downstream development affecting the hazard classification and associated spillway design requirements of dams. To that end, the Department has been recently working with numerous stakeholders on possible legislative solutions to this problem.

		"high" hazard classification.	As noted in the comment above, determining which standard to design to is the dam owner's responsibility and decision. Should the owner determine not to improve the spillway to the full PMF, there will always be a possibility of a need for future upgrades.
122	Timothy A. Mitchell (City of Lynchburg)	Measures to prevent future increases in spillway capacity might include: 1) zoning to prohibit building within the PMF dam-break inundation zone, 2) purchase of conservation easements within the PMF dam-break inundation zone, or 3) purchase of the affected properties. Purchase of conservation easements would appear the most feasible. Inundation zoning, especially outside the owner's jurisdictions, or property acquisition seem equally not feasible.	The Board's regulatory authority does not extend to regulation of downstream property owners. The Department is aware of the issue of downstream development affecting the hazard classification and associated spillway design requirements of dams. To that end, the Department has been recently working with numerous stakeholders on possible legislative solutions to this problem, and as a result, House Bill 837 has been introduced during this year's General Assembly session. This bill would create responsibilities for developers of downstream development to contribute to upgrade costs, grant greater planning and zoning responsibilities to localities, and create notification responsibilities related to dam break inundation zones.
123	Timothy A. Mitchell (City of Lynchburg)	According to a summary of state dam safety regulations posted on the DCR website, the proposed regulations appear to be more stringent than most of the states surveyed. Under the proposed regulations, the Pedlar Dam spillway design flood would be ¾ PMF or PMF, depending upon its new hazard classification, but because of the future downstream development issue raised above, more likely PMF. Lost in the development of these regulations is the huge incremental cost between one SDF or another, which can only be determined through engineering analysis, design, and construction yet to be done.	Table 1 has been amended, including the required SDFs. The SDF requirements contained in Table 1 are believed to be in line with the requirements of other states.
124	Timothy A. Mitchell (City of Lynchburg)	The hazard definitions are subjective. We can appreciate that judgment in applying the regulations is desirable, but are apprehensive that the lack of definition might lead to overly conservative or inconsistent rulings.	To assist with clarity in determining hazard potential classifications, definitions for the terms "probable loss of life", "may cause loss of life", and "no expected loss of life" have been added to the regulations.
125	Daniel Osborne (Camp Jacob)	Camp Jacob has owned this dam and has been in existed for 23 years. The dam itself has been there for 40 years. It was constructed in part by the Army Corps of	To "grandfather" existing structures would ignore the reality that public safety is not dependent upon the age of an impounding structure, but rather on

		Engineers. Up to this point it has been considered a relatively safe dam. In my opinion we are changing our definition of safe. Just because of that change in definition, it doesn't seem right to me that we would require something that was once safe just because we changed our opinion on what is safe. The dam hasn't changed.	its design and condition. The technical advisory committee that assisted with the development of the regulations considered the issue of setting different standards for old and new impounding structures, including grandfathering of existing structures. Following this discussion, it was determined that public safety interests mandated the equal treatment of all impounding structures, and that all structures meet what is known to be safe by today's standards. In order to allow for impounding structures that are in compliance with the Board's regulations to have time necessary to upgrade to the new standards contained in these regulations related to spillway design flood, section 125 does contain a delayed effective date provision that would permit these upgrades to be phased in over an 8 to 11 year period. Additionally, the language that was previously contained in section 130 of the regulations has been relocated to section 52, which contains the incremental damage analysis. The incremental damage analysis allows the spillway design requirement of an impounding structure to be reduced where it can be shown that the reduction would not cause an additional threat to public safety.
126	Daniel Osborne (Camp Jacob)	The next comment under the grandfathering had to do with providing complete funding. To me that would be the appropriate action if you are going to impose requirements on existing dams. That should be coordinated with the providing of funds. I hope the Board and all the legislators will consider the fact that there is at least one small dam owner that they can put out of business due to a change in their definition of safe.	It is recognized that upgrades and repairs to dams are often very expensive. The Dam Safety program, however, is tasked with ensuring the safe construction, operation and maintenance of the Commonwealth's dams through implementation of the Board's regulations. The changes made to the regulations are intended to minimize the costs associated with upgrades to dams to the extent possible while ensuring that an adequate level of public safety is maintained. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and

			repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
127	Alan Nichols (Windsor Lake Corporation)	You've lumped the fees in such a way and some of the categories that what happens is that the smaller dam owners are getting caught up in ways that are not tolerable for us to be able to manage.	The fees contained in sections 340-400 of the regulations have been amended and reduced from those contained in the initial proposed regulations. It is believed that the fee levels that have been set will be manageable for dam owners.
128	Alan Nichols (Windsor Lake Corporation)	I'd urge you if nothing else to look at a second tier for fees. That tier would be not whether it is high or low hazard, but realistically about the size of the dam itself. I think there needs to be more flexibility size-wise.	The fees contained in sections 340-400 of the regulations have been amended and reduced from those contained in the initial proposed regulations. It is believed that the fee levels that have been set will be manageable for dam owners. Fees were established based on the workload associated with different categories of dams. It is the Department's experience that this workload varies by hazard classification and not by the size of the dam; therefore, the fees continue to be set based on hazard classification.
129	Connie Bennett (York County)	It was brought to my attention that the classifications were broken out so that the first order was what was downstream of the system. In other words if it was a dam that had a secondary or primary road or major facility downstream from it that put it in a classification regardless of the size of the dam or the height of the dam. I think it needs to clarify in the definition at least for the 6 ft. height dam that regardless of the storage capacity if the intent is that the secondary roadway or major utility downstream that would also come under the requirement of needing a permit.	With some exceptions, impounding structures that are 25 feet and greater in height and that create a maximum impoundment capacity of 15 acre feet or greater and those that are 6 feet or greater in height and that create a maximum impoundment capacity of 50 acre feet or greater are regulated and would require a permit. These size requirements are specified by the Dam Safety Act (§10.1-604 et seq. of the Code of Virginia) and included in section 30 of the regulations, in the definition of what constitutes an "impounding structure" for the purposes of the regulations.
130	Connie Bennett (York County)	The other question that was brought up at a meeting that we had was the impact of the changes in spillway height could be impacting upstream owners especially in the Tidewater Area. If you have to raise the height of the dam it puts more people around the body of water in the flood area. It may be impacting more people upstream than	The Board's authority under the Dam Safety Act (§10.1-604 et seq. of the Code of Virginia) is limited to ensuring the safe design, construction, operation and maintenance of Virginia's impounding structures. Limitations on the area occupied by an impoundment are outside of the Board's authority and are subject to other laws and regulations,

		down stream.	as well as general property law principals.
131	Scott Cahill (Watershed Services, Inc.)	4VAC50-20-80. I'm still very concerned about the concept of requiring an alteration permit for items, which are considered maintenance even in the verbiage. I think that a dam owner should be free to continue to do items of maintenance on his dam without any incumbent cost or inconvenience whatever.	Language has been added to section 30 and section 80 to specifically state that "structural maintenance" (for which a permit is required) does not include routine maintenance. This would effectively clarify that no permit is required for routine maintenance. Overall, the term "alteration" is defined in section 10.1-604 of the Code of Virginia and the Board does not have the authority to vary that definition. As observed by the new language, however, the definition is limited to repairs or maintenance related to the structural integrity of the impounding structure, and is not intended to extend to repairs and maintenance not related to the impounding structure's structural integrity. Section 80 of the regulations additionally provides examples of activities that do require alteration permits.
132	Scott Cahill (Watershed Services, Inc.)	On 4VAC-50-20-105, Subsection e-1, I would like to recommend that we incorporate into here a statement requiring the engineers to have some inspections done on the conduits and structures of the dams. We see a whole lot of failures due to parallel porting and failures of conduits.	While inspections of conduits are recommended, it is believed that there are a limited number of engineering firms available to conduct such inspections and that the costs of these inspections would be overly burdensome to require of every dam owner. The dam owner's engineer should, however, recommend such inspections where believed necessary.
133	Scott Cahill (Watershed Services, Inc.)	4VAC50-20-390. The cost of the permits both under the conditional and under the regular, I would implore you that you consider the cost of these permits and mitigate the cost to the dam owners doing the right things and increase the costs to the dam owners not doing the right things.	The costs of permits set forth in sections 340-400 of the regulations have been amended and reduced. It is believed that the costs associated with regular operation and maintenance certificates will be manageable for dam owners, while fees for conditional operation and maintenance certificates will be higher.
134	Lisa Cahill (Watershed Services, Inc.)	One of my issues with the regulations is the infamous Table 1. Line 213 is where that starts. It contains sizes of dams. Since the issue here is basically public safety and to protect human life, the size of the dam that would injure or kill someone is really irrelevant and has no place in Table 1.	Table 1 has been revised and no longer distinguishes among impounding structures based on their size.
135	Lisa Cahill (Watershed Services, Inc.)	I also agree that an operation permit should not be needed for maintenance. It discourages proper action. It's too easy at that point to say I just won't replace the seal instead. Their time is restricted,	Language has been added to section 30 and section 80 to specifically state that "structural maintenance" (for which a permit is required) does not include routine maintenance. This would

		their efforts are restricted and the path should be paved for them as much as possible to do the right thing.	effectively clarify that no permit is required for routine maintenance. Overall, the term "alteration" is defined in section 10.1-604 of the Code of Virginia and the Board does not have the authority to vary that definition. As observed by the new language, however, the definition is limited to repairs or maintenance related to the structural integrity of the impounding structure, and is not intended to extend to repairs and maintenance not related to the impounding structure's structural integrity. Section 80 of the regulations additionally provides examples of activities that do require alteration permits.
136	Lisa Cahill (Watershed Services, Inc.)	Line 1587 and following, which is Section 50-20-280, drain requirements. I would proposed that the word "new" be struck so that it reads all impounding structures, regardless of their hazard conditions, classification shall include a device to permit draining of the impoundment within a reasonable time as instructed by the owner's licensed professional engineer. I would hate for existing dams to begin to think they could do away with drainage structure.	Language has been added to section 280 to require that existing drains be kept operational, and that drains be added to existing impounding structures when practicable.
137	Lisa Cahill (Watershed Services, Inc.)	Section 50-20-280. Also I would strike the last few words, "subject to the approval by the Director."	The language, "subject to the approval by the Director," has been removed.
138	Barlow Delk (Louisa County Water Authority)	One of the things pointed out is possibly that the spillways are not wide enough. The requirements were changed on the spillway. One of our points is that we didn't want to comply with proposed regulations. You're in the process of writing those regulations. If we comply with proposed regulations what's there to say after we've spent the money and we come back and a few things are different in the regulations.	The requirements contained in the proposed regulations are not applicable until the effective date of the regulations. Until that time, the previous regulations remain applicable.
139	Barlow Delk (Louisa County Water Authority)	The regulations are asking for a dam break analysis using a probable maximum flood without a dam failure. What is a dam break analysis if the dam didn't fail? That sounds like a probable maximum flood analysis, but you are asking us or somebody down the road to do something that is completely illogical.	Section 54(D)(3) has been amended to remove the reference to a "dam break analysis without a dam failure." The intent of that provision is to demonstrate a flooding event without a dam failure for comparison with a demonstration of a flooding event with a dam failure. This will show the impact of the dam failure in addition to the flooding condition.
140	Barlow Delk (Louisa County Water	Somehow these regulations claim that 100 acre-feet of water in an agricultural	The exemption for agricultural dams is contained in the Code of Virginia

	Authority)	pond that's say, 24.5 feet tall, is of no hazard downstream. It doesn't even ask anything, it just asks the owner to say it's an agricultural pond. There is no analysis downstream.	(specifically in the definition of "impounding structure" contained in §10.1-604) and the regulations merely reflect this exemption. The Board does not have the authority to alter or remove the agricultural exemption, which would require an act of the General Assembly.
141	Barlow Delk (Louisa County Water Authority)	PMF to me has a special meaning. When I have the data sent to me saying 28 inches of rain in six hours, I would define that as August 19-20, 1969, Lovingston, Virginia in Nelson County. I was out in that probable maximum flood. Many miles of highway will be washed away by the probable maximum flood. I saw five tractor-trailer trucks parked on the side of Route 29 washed away by a probable maximum flood. In months of looking, we never found a single trace of those trucks anywhere. One tractor-trailer was found buried in sand in a place called Nelson Wayside. You are talking about asking us to design and maintain dams that will handle this water. I think you are fooling yourselves and the people of Virginia if you think that you are going to save anyone or do anything in a probable maximum flood. I almost think PMF trivializes what we are talking about.	It is recognized that a PMF event is a flood of extreme magnitudue. As recognized by the comment, data shows that PMF events can and do occur in Virginia. The Board is charged by the Dam Safety Act, §10.1-604 et seq. of the Code of Virginia, to adopt regulations that provide for the safe design, construction, operation, and maintenance of Virginia's impounding structures. The Board must be guided by this mandate in adopting regulations. As Virginia does experience events approaching and including the PMF, it is appropriate to ensure that higher hazard dams are prepared to sustain such a flood.
142	Barlow Delk (Louisa County Water Authority)	We're asked to build new dams and retrofit dams to do this. After 9/11 did anyone say we should go through New York City and retrofit every building? When a tornado comes through Kansas they don't say that we will build back to withstand a probable maximum tornado.	It is understood that other types of infrastructure are not required to upgrade each time that standards are changed. In the case of impounding structures, however, public safety, which is the sole concern of the regulations, is directly impacted by the standards in place. To "grandfather" existing structures would ignore the reality that public safety is not dependent upon the age of an impounding structure, but rather on its design and condition. The technical advisory committee that assisted with the development of the regulations considered the issue of setting different standards for old and new impounding structures, including grandfathering of existing structures. Following this discussion, it was determined that public safety interests mandated the equal treatment of all impounding structures.
143	Barlow Delk (Louisa County Water Authority)	I work with water and sewer business in Louisa County. I'm on the side of I-64 all the time. I look at a seven ft. by six ft.	The Board's mandate pursuant to the Dam Safety Act (§10.1-604 et seq.) is to adopt regulations that provide for the

		culvert. Every one of those at a probable maximum flood is a dam. I don't think any of them would take 28 inches of water in six hours. Under the Southern Railroad in the county there is a tunnel under it about 20 feet wide about 25ft high. That tunnel under the Southern Railroad will back water up 50 ft. deep on a 60ft field for over a mile. That's a probable maximum flood in reality.	safe design, construction, operation, and maintenance of Virginia's impounding structures. While other types of infrastructure may be designed to criteria different than that required for impounding structures, the Board must set forth the requirements that it believes are necessary to carry out its mandate pursuant to the law.
144	Lisa Cahill (Watershed Services, Inc.)	Line 114 references the crest of the lowest un-gated outlet. As I was first reading the regs., seeing the word "crest" made me think of the spillway, like the emergency spillway, which would be appropriate. But as I read further, I felt that could be construed to be the top of the riser or structure, which would cause that reference to be normal pool height which would probably not be appropriate. That term is not specifically defined in the definitions section and I think a definition would be very helpful.	The term referred to by the comment, "normal impounding capacity", has been removed from the regulations and a new term, "normal or typical water surface elevation," has been added. The new definition does retain the reference to "lowest ungated outlet," but does provide for other levels to be considered in the instances of flood control or stormwater detention structures, or if the level at the lowest ungated outlet is not typical.
145	Lisa Cahill (Watershed Services, Inc.)	Some other definitions seem to be needed. Line 160 "serious economic damage", Line 166 "appreciable economic damage," and Line 174 "minimal economic damage." I'm not sure the right way to do that. I'm sure that dollar values might not be appropriate. But some guidance needs to be there because what you might consider minimal economic damage I might consider major economic damage.	Due to difficulties in establishing dollar value thresholds statewide, and in order to allow engineering judgment to factor in to determinations of hazard classification, terms related to levels of economic damage have been left flexible. This does not foreclose the possibility of guidance being issued in the future.
146	Lisa Cahill (Watershed Services, Inc.)	Some other definitions seem to be needed. Same thing for primary and secondary utility. I'm not absolutely certain what a secondary utility is unless we're talking size of people serviced by a particular utility. And if that's the case, then define it that way.	It is believed that impacts to utilities are more a question of degree of impact than of type of facility. Therefore, the terms "primary" and "secondary" have been removed from the regulations. The requirement for consideration of impacts to "utilities" remains.
147	Lisa Cahill (Watershed Services, Inc.)	The roads also seem to need some definition to me. Major public roads, public roads and secondary public roads are what are listed in the high significant and low hazard classification. I think in this case the use of VDOT definitions for those roads would be appropriate. I know that they have maps for each county where they specifically say which roads are secondary, which roads are primary.	Definitions for the terms "major roadways" and "secondary roadways" have been added to section 40 in order to increase specificity.
148	Dan Rublee (City of Harrisonburg)	In regard to the inundation zone mapping, can there be some kind of	The Board's regulatory authority does not extend to regulation of downstream

		legislation that forces or requires the jurisdictions in the inundation zones to be cooperative with dam owners in regard to determining land owners, property owners, planned land use and things like that. I fear particularly for private landowners who may be trying to get information from the local government.	property owners. The Department is aware of the issue of downstream development affecting the hazard classification and associated spillway design requirements of dams. To that end, the Department has been recently working with numerous stakeholders on possible legislative solutions to this problem, and as a result, House Bill 837 has been introduced during this year's General Assembly session. This bill would create responsibilities for developers of downstream development to contribute to upgrade costs, grant greater planning and zoning responsibilities to localities, and create notification responsibilities related to dam break inundation zones.
149	Dan Rublee (City of Harrisonburg)	On Line 184, this discusses the present and planned land use in the dam break inundation zone to be used for determining classifications. Planned land use is a very undefined term. That could mean anything something that needs to be constructed to something that's in a long-range construction plan that might change at some point in the future. I think there needs to be some kind of clarification as to what planned land use would mean.	To increase clarity, a definition of "planned land use" has been added to the definitions section (section 30) of the regulations. The current definition is "…land use that has been approved by a locality or included in a master land use plan by a locality, such as in a locality's comprehensive land use plan."
150	Dan Rublee (City of Harrisonburg)	Line 239 talks about the PMF hydrographs used for looking at the analyses. It says that the hydrograph that creates the largest peak outflow is to be used. I guess I'm confused as to whether that is the largest peak flow from the hydrograph or is that actually the largest peak outflow after you've routed the hydrograph through the dam facility.	The language cited by the comment is intended to be interpreted as the largest peak outflow after the hydrograph is routed through a dam facility.
151	Dan Rublee (City of Harrisonburg)	Line 285 discusses in the incremental damage analysis water depths greater than two feet and over bank flow velocities greater than three feet per second shall be used to define conditions for unacceptable additional downstream threat. This is a question to clarify whether or not that is an additional two feet and additional three feet per second or is that those numbers in general. That could be better defined.	The language cited by the comment has been revised to specify that "an additional downstream threat to persons or property is presumed to exist when water depths exceed two feet or when the product of the water depth (in feet) and the average floodplain flow velocity (in feet per second) is greater than seven."
152	Dan Rublee (City of Harrisonburg)	Under Section 54, Dam Break inundation zone mapping, this discusses that when determining hazard potential classifications, a minimum of the following shall be provided and it	Section 54(D)(3) has been amended to require an "analysis", rather than a "dam break analysis", in order to aid clarity.

		talks about the different analyses that need to be done. Items two and three say a dam break analysis using a PMF with a failure and a dam break analysis using a PMF without a dam failure. I understand that a dam break analysis doesn't necessarily infer that the dam actually breaks. Could you just put analysis there as opposed to dam break analysis? There is confusion as to how you can have a dam break analysis without a dam failure.	
153	Dan Rublee (City of Harrisonburg)	In the inundation map section, Paragraph "e" under EAP requirements, it says you are required to keep a list of downstream inundation zone property owners and occupants. I don't think that any jurisdiction can actually keep up with the occupants of specific structures. In the case of the dam that the City of Harrisonburg owns, a lot of the downstream property is renter occupied and not owner occupied. It becomes quite a task to track down specific occupants. In our jurisdiction we have implemented our EAP through a reverse 911 calling system. That's been acceptable to the reviewers as far as our permitting goes. I wonder if there can be some kind of language in that section that allows for alternatives to the specific listings of owners and occupants and things like that where technology can be better utilized.	Section 175 has been amended to clarify that systems such as reverse 911 may be utilized. The dam owner is responsible for developing a notification chart demonstrating how parties affected by a dam failure will be notified; use of reverse 911 is just one method that may be utilized by a local emergency services department to achieve notification of downstream residents, if that responsibility is assigned to the emergency services department.
154	Dan Rublee (City of Harrisonburg)	In Section 175, under the emergency action plan requirements it discusses the drills and exercises required in the EAP. I'd like to comment that, at least for the tabletop exercise, you're talking about pulling together quite a number of people who are very busy. I'd like to submit that rather than have that on a 2-year or 3-year basis that it would be done on the same cycle with the re-permitting phase. So it would be done on a six-year cycle as opposed to a three-year cycle, bringing state, local and possibly federal emergency personnel together.	Section 175 has been amended to require that tabletop exercises be conducted once every six years. Additionally, the language of that section has been modified to allow these exercises to be conducted in combination with exercises for other impounding structures when the involved parties would be the same.
155	Charles de Seve (Lake Barcroft Watershed Improvement District)	Your study group thus far has recommended an extreme scenario as the basis for new dam regulations. It envisions a storm of such devastating effect as to render the area for which we are concerned a catastrophe of	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

	NOTE: At the February 1, 2008 Virginia Soil and Water Conservation Board Meeting, Mr. Charles de Seve (Lake Barcroft Watershed Improvement District) noted that since submitting comments, the WID has been able to work with DCR staff to gain an understanding of how the regulations would work. He indicated that their concerns have been answered by DCR and that the WID would like to withdraw their previous objections.	Hurricane Katrina proportions. It would seem to the LBWID that the State has made up its mind on an unreasonable criterion and will consider nothing else. It is easy to set the most stringent standard to avoid applying judgment as opposed to considering what is reasonable and justifiable. To arbitrarily define the standard for dam safety without a thorough analysis of the effects is not in the best interests of the State, the Division of Conservation and Recreation and the Board itself.	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).
156	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	As they stand, the proposed regulations translate into a huge expense for both local government and private dam owners without even a vague assessment of the added safety that dam modifications would confer. There are alternatives to consider, particularly in creating, funding and implementing serious and well designed emergency action plans, addressed in the regulations but not the central focus it should be. Local government and private dam owners have a finite amount of money available, and the Board has not shown evidence that its regulations will make wise use of funds or enhance public safety to a significant degree.	It is recognized that upgrades and repairs to dams are often very expensive. The Dam Safety program, however, is tasked with ensuring the safe construction, operation and maintenance of the Commonwealth's dams through implementation of the Board's regulations. The changes made to the regulations are intended to minimize the costs associated with upgrades to dams to the extent possible while ensuring that an adequate level of public safety is maintained. The changes made to the regulations additionally include the availability of an incremental damage analysis to all dams. This analysis allows the required spillway design of a dam to be reduced where it is shown that failure of the dam during a specific flood condition will not cause an additional downstream threat. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was

			authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
157	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	The proposed regulations are based on the wrong assumption that requiring dams such as Lake Barcroft's to withstand a one PMF storm event will significantly reduce the risk to lives and property downstream.	It is recognized that a PMF event is a flood of extreme magnitude. As recognized by the comment, data shows that PMF events can and do occur in Virginia. The Board is charged by the Dam Safety Act, §10.1-604 et seq. of the Code of Virginia, to adopt regulations that provide for the safe design, construction, operation, and maintenance of Virginia's impounding structures. The Board must be guided by this mandate in adopting regulations. As Virginia does experience events approaching and including the PMF, it is appropriate to ensure that higher hazard dams are prepared to sustain such a flood.
158	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	The Board's discussions of inundation tend to create the impression that the danger to life and property is mainly the result of spillway or dam failure. In the case of Lake Barcroft, engineering studies show conclusively that the greatest risk to life and property downstream is the flooding that would occur during any PMP/PMF with no dam failure.	It is recognized that flood situations other than dam failure can have impacts to life and property. The Board's mandate pursuant to the Dam Safety Act (§10.1-604 et seq. of the Code of Virginia), however, is to ensure the safe design, construction, operation, and maintenance of the Commonwealth's impounding structures. The proposed regulations, as revised, attempt to fulfill that mandate.
159	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	The severe and unbending nature of the regulations appear to be a substitute for the more complex tasks of gathering and analyzing data, measuring degrees of risk and calculating the incremental benefits and costs of new regulations. It is as if the decision was to pick the maximum storm event, require dams to withstand it, and simply assume lives and property were made safer. This may actually put more lives at risk.	Section 50 of the regulations, which includes Table 1 (containing spillway design flood requirements) has been revised significantly from the proposed regulations. Still, it does require PMF standards for high hazard dams. The new regulations do contain, however, an opportunity for a site-specific incremental analysis to be conducted (section 52). This analysis will allow the spillway design flood requirement to be tailored to an individual dam where it can be demonstrated that a reduction in the required design flood will not increase threats to life or property.
160	Charles de Seve (Lake Barcroft Watershed Improvement District)	No one, not the Board, not DCR, not the Virginia Department of Planning and Budget (which did an admittedly incomplete economic impact analysis), nor the local government, has a useful	Since the number of regulated dams in the Commonwealth was greatly expanded due to a 2002 change to the Code of Virginia, the Department has been actively working to compile and

	[See Note in 155]	census of dams and their situations throughout Virginia. No one has amassed complete data on the likely areas of flooding and of inundation, the persons and properties at risk of flooding and inundation, the likelihood of existing impoundment structures to fail at different storm levels, and the reduced level of risk and higher cost that implementing these proposed regulations might bring.	analyze a complete dam inventory for the state. The Department continues to seek funding for dam safety engineer positions to assist with this task.
161	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	For low freeboard dams like Lake Barcroft, the regulations will do little to improve safety. For high freeboard stormwater retention dams there is the greater potential for the regulations to reduce risk. The proposed regulations make no proper distinction among dams and their unique situations.	Engineering analyses are site specific (section 20) and will consider each dam independently. The criteria contained in the regulations were developed based on what is believed necessary to be protective of public safety.
162	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	Elimination of subjectivity in the proposed regulations is presented by the Board as a positive accomplishment. In fact, it eliminates or reduces essential engineering judgment that would take into account unique conditions for specific dams.	The regulations continue to recognize that engineering judgment is necessary and will be a large factor in determinations to be made. Subsection (E) of section 20 provides that "design, inspection and maintenance of impounding structures shall be conducted utilizing competent, experienced, engineering judgment that takes into consideration factors including but not limited to local topography and meteorological conditions." It is expected that engineering judgment will still be applicable to areas including, but not necessarily limited to, hazard classification (section 40) and incremental analysis (section 52).
163	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	The proposed regulations are overly restrictive in that certain dams are required to withstand a universal standard (one PMF) without respect to their downstream hydrology and the pattern of downstream development. If it is the intention of the Board to allow these factors to be taken into account when evaluating the need to redesign dam structures, then the regulations should provide more guidance or at least the flexibility for engineering judgment to intervene.	As noted in the previous comment, the regulations continue to recognize that engineering judgment is necessary and will be factor in determinations to be made. The changes made to the regulations additionally include the availability of an incremental damage analysis to all dams. This analysis allows the required spillway design of a dam to be reduced where it is shown that failure of the dam during a specific flood condition will not cause an additional downstream threat.
164	Charles de Seve (Lake Barcroft Watershed Improvement	It is doubly inappropriate to simultaneously add more restrictive regulations pertaining to spillways when their consequences are largely	Table 1 of section 50, which contains the spillway design flood requirements for impounding structures, has been significantly revised from the proposed

	District) [See Note in 155]	unknown and to also remove the flexibility to take particular circumstances into account as facts and consequences emerge.	regulation and it is believed that the revisions will provide more flexibility for dam owners. Additionally, section 52 of the regulations provides for an incremental analysis, which would allow for a reduction to the required spillway design flood where it can be shown that such a reduction will not increase threats to lives or property.
165	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	In support of the proposed regulations there is only the most rudimentary and casual estimate of the cost to local government and private dam owners to comply. Yet knowing the cost is essential to making decisions about where to apply scarce funds to protect the most lives. The cost of these regulation are huge and would severely reduce money available for more essential lifesaving and risk-averting programs.	Requirements in the regulations that would cause the need for upgrades to impounding structures have been amended and it is believed that this amendment will result in significant cost savings from the estimated cost of the regulations that were initially proposed by the Board. The estimates contained in the economic analysis for the proposed regulations were based on a national study on dam repair and upgrade costs 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". It was specifically recognized in the "significant qualifiers" portion of the economic analysis that these costs may have risen since the time of that report and may continue to rise over time. Other cost information, including dam break inundation zone mapping and incremental analysis, were developed through receiving estimates from various engineering firms that perform work on impounding structures in Virginia.
166	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	The statewide cost, officially estimated at $249 million, well under $1.5 million per dam (for the 166 dams officially assumed to need alteration), is low when compared to a $20 million estimate for Lake Barcroft's dam alone. Even the inundation mapping cost of $16,417 is well below Lake Barcroft's cost of approximately $60,000.	Requirements in the regulations that would cause the need for upgrades to impounding structures have been amended and it is believed that this amendment will result in significant cost savings from the estimated cost of the regulations that were initially proposed by the Board. The estimates contained in the economic analysis for the proposed regulations were based on a national study on dam repair and upgrade costs 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". It was specifically recognized in the "significant qualifiers" portion of the economic analysis that these costs may have risen since the time of that report and may continue to rise over time. Other cost information, including dam break inundation zone mapping and incremental analysis, were developed through receiving estimates from various engineering firms that perform work on impounding structures in Virginia.
167	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	To pay for the estimated $20,000,000 cost of design and rebuilding required to meet the new standard, the Lake Barcroft Water Improvement District would have to sell 30 year bonds requiring an annual payment of $1,400 per family in the district. This would mean a three-fold increase in the property tax that LBWID imposes going from $700 per family per year to $2,100.	It is recognized that upgrades and repairs to dams are often very expensive. The Board's regulations (or the Dam Safety program), however, is tasked with ensuring the safe construction, operation and maintenance of the Commonwealth's dams. The changes made to the regulations are intended to minimize the costs associated with upgrades to dams to the extent possible while ensuring that an adequate level of public safety is maintained. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
168	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	Greater emphasis on implementing emergency action plans and other approaches would save more lives and property than the new spillway requirement, certainly in the case of Lake Barcroft and in similar situations through Virginia.	It is recognized that emergency action plans have an important role to play in protecting lives and property in emergency situations at impounding structures. To that end, the regulations contain significant improvements to specifications regarding emergency action plans. Non-structural mechanisms, however, cannot be relied upon alone to protect lives and property. It is important that dam structures be designed, constructed, maintained, and operated in a way that is protective of

			public safety.
169	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	The safety of lives and property would be better served by sound and well-funded emergency action plans to secure property and remove persons from flood areas, than by re-engineering certain dams. While the proposed regulations speak to EAPs, there is no guidance or standards of action or accompanying recommendations to fund the required effort.	It is recognized that emergency action plans have an important role to play in protecting lives and property in emergency situations at impounding structures. To that end, the regulations contain significant improvements to specifications regarding emergency action plans. Non-structural mechanisms, however, cannot be relied upon alone to protect lives and property. It is important that dam structures be designed, constructed, maintained, and operated in a way that is protective of public safety.
170	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	Effective EAPs will require far more public funding for personnel, training and equipment to conduct inspections, monitor storms, evacuate persons and secure property than currently budgeted. However, this approach will offer significantly greater risk reduction and higher public safety levels than spending scarce funds to make dams withstand a one PMF storm event. EAPs are the real path to reducing risk from storms.	As noted above, it is recognized that emergency action plans have an important role to play in protecting lives and property in emergency situations at impounding structures. To that end, the regulations contain significant improvements to specifications regarding emergency action plans.
171	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	Implementing dams to withstand a one PMF storm event gives a false sense of security because such a storm is highly unlikely compared to far lesser storms that will certainly put lives at risk and cause massive property damage.	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).
172	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	Spending massive amounts to make dams fail-safe in the improbable event of a one PMF storm will reduce funds available to protect lives and property during the 100 year storms and less that are far more likely to occur and will surely produce severe flooding and risk to lives and property. Other things equal, scarce funding is better spent where it can more effectively reduce eminent risks than rare ones.	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).
173	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	The one PMF standard for dams is inconsistent with the actual zoning and development of real estate within the flood plain and inundation area. The flood plain of a one PMF event is much more extensive and will embrace many more families and property than that of the 100-year storm usually envisioned in flood insurance limits and for zoning restrictions on development.	It should be noted that the FEMA 100 year floodplain is not the same as the 100 year storm standard. While the PMF flood event will be greater than the 100 year flood event, the criteria contained in the regulations are based on what is believed necessary for the safe design, construction, operation and maintenance of dams.
174	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	The so called economic impact statement and cost-benefit analysis conducted by the Virginia Department of Planning and Budget is woefully inadequate. It cannot possibly guide the Board on the cost of the proposed regulations, the economic and social benefits relative to cost, the impact on taxpayers, on units of government, on private owners and on the economy of Virginia.	Requirements in the regulations that would cause the need for upgrades to impounding structures have been amended and it is believed that this amendment will result in significant cost savings from the estimated cost of the regulations that were initially proposed by the Board. The estimates contained in the economic analysis for the proposed regulations were based on a national study on dam repair and upgrade costs 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". It was specifically recognized in the "significant qualifiers" portion of the economic analysis that these costs may have risen since the time of that report and may continue to rise over time. Other cost information, including dam break inundation zone mapping and incremental analysis, were developed through receiving estimates from various engineering firms that perform work on impounding structures in Virginia.
175	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	The economic analysis should consider the relationship between cost and risk. It is not evident either in the regulations or in the economic report that the trade-off between safety and cost is understood. All systems are subject to failure and typically the cost to reduce risk increases more than proportionately as the level of risk reduction rises. It is hard to imagine	It is recognized that upgrades and repairs to dams are often very expensive. The Dam Safety program, however, is tasked with ensuring the safe construction, operation and maintenance of the Commonwealth's dams through implementation of the Board's regulations. The changes made to the regulations are intended to minimize the costs

		any systems (bridges, highways, aircraft, nuclear reactors, etc.) designed to withstand the conditions at the very end of the applicable probability curve. The wording of "Probable Maximum Precipitation" and "Probable Maximum Flood" suggest the regulations are trying to push into extreme definitions of risk, which will prove to be highly expensive yet ineffective in reducing risk significantly.	associated with upgrades to dams to the extent possible while ensuring that an adequate level of public safety is maintained. The changes made to the regulations additionally include the availability of an incremental damage analysis to all dams. This analysis allows the required spillway design of a dam to be reduced where it is shown that failure of the dam during a specific flood condition will not cause an additional downstream threat. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
176	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	Under the proposed regulations, there is no provision to grandfather dams constructed earlier than 1982, a practice under current regulations. There is a real difference between old and new dams with older dams incurring far higher costs to comply via retrofitting despite having a satisfactory record of safety, inspections and maintenance.	To "grandfather" existing structures would ignore the reality that public safety is not dependent upon the age of an impounding structure, but rather on its design and condition. The technical advisory committee that assisted with the development of the regulations considered the issue of setting different standards for old and new impounding structures, including grandfathering of existing structures. Following this discussion, it was determined that public safety interests mandated the equal treatment of all impounding structures. In order to allow for impounding structures that are in compliance with the Board's regulations to have time necessary to upgrade to the new standards contained in these regulations related to spillway design flood, section 125 does contain a delayed effective date provision that would permit these upgrades to be phased in over an 8 to 11 year period. Additionally, the language that was previously contained in section 130 of the regulations has been relocated to

			section 52, which contains the incremental damage analysis. This new section would allow the old section 130 process to be applied to all dams, including those constructed prior to 1982.
177	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	There should be a strong recommendation accompanying the proposed regulations that the Commonwealth provide funds for local governments and private owners to reconstruct their dams. Both the enormous cost of rebuilding dams and the fact that permitted downstream and upstream development created much of the risk suggests the expense of retrofitting be a cost of society born by all through statewide taxes.	Financial needs of dam owners are recognized. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round will be conducted between December 1, 2007 and February 1, 2008.
178	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	There is concern that a number of existing dams do not meet current standards. Funds are better spent on inspections and stronger more effective enforcement in these instances. More stringent regulations will not remedy deficiencies if current less severe ones do not.	The Board is charged by the Dam Safety Act, § 10.1-604 et seq. of the Code of Virginia, to adopt regulations that ensure the safe design, construction, operation and maintenance of Virginia's impounding structures. In conducting this revision to the regulations, which were last reviewed comprehensively in 1989, the Board must be guided by its mandate. While it is recognized that many impounding structures still need additional work to become compliant with current requirements, waiting to adopt proper standards will do little more than cause these structures to undergo two upgrades instead of one (one in order to meet current standards, and then another to meet revised standards at a later date should the standard be increased). This would increase the overall burden to impounding structure owners. To assist impounding structure owners with compliance, the Department continues to seek additional staffing in order to provide additional outreach and guidance. The Department also continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the

			2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008
179	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	We recommend to the Board the following: continue with the regulatory process, but withhold final regulations until valid cost-benefit measures can be calculated to ensure that public and private investment is made in ways that truly reduces risk to life and property.	It is recognized that upgrades and repairs to dams are often very expensive. The Dam Safety program, however, is tasked with ensuring the safe construction, operation and maintenance of the Commonwealth's dams through implementation of the Board's regulations. The changes made to the regulations are intended to minimize the costs associated with upgrades to dams to the extent possible while ensuring that an adequate level of public safety is maintained. The changes made to the regulations additionally include the availability of an incremental damage analysis to all dams. This analysis allows the required spillway design of a dam to be reduced where it is shown that failure of the dam during a specific flood condition will not cause an additional downstream threat. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
180	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	We recommend to the Board the following: mandate inundation mapping for all significant dams. For both one-half PMF and one PMF, maps would show the area of general flooding and the area of inundation following dam failure for each impoundment. Maps would also include a count of persons and property within the areas affected.	Mapping of all structures is required for hazard classification purposes except for certain low-hazard dams. Sunny day, probable maximum flood, and spillway design flood failure scenarios are required, as well as spillway design flood without a failure. Maps are required to identify downstream structures and residents.
181	Charles de Seve (Lake Barcroft Watershed Improvement District)	We recommend to the Board the following: commission studies to: (a) Calculate the degree of risk reduction (counts of persons and property) moving from the current standards to the proposed regulations using the	The regulations are the result of the work of a technical advisory committee process that extended over a six-month period and included dam owners, consultants, localities, state and federal representatives, and others. Much

	[See Note in 155]	required inundation maps. (b) Evaluate alternative strategies to protect lives and property--to what extent could well constructed Emergency Action Plans (EAP) save lives and property during general flooding and with inundation from a dam failure. Estimate their cost. (c) Calculate realistic estimates of the cost of reengineering and implementation of the alterations for each dam to comply with the proposed regulations. (d) Calculate the incremental benefit of the proposed regulations compared to the cost. This would be a true cost-benefit analysis that takes account of the joint probabilities of flooding and inundation and the lives and property at risk. (There are standard models and tools for this.)	discussion and analysis was completed during this process and during the process following the TAC that resulted in the economic impact analysis for the proposed regulations, as well as during the public comment period on the proposed regulations. It is believed that the final product of this work is a set of regulations that effectively promote the safe design, construction, operation, and maintenance of Virginia's dams, while being cognizant of dam owner concerns and circumstances.
182	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	We recommend to the Board the following: request that the Commonwealth provide additional regional engineers and augment dam safety by enforcing compliance with existing regulations, particularly for those dams already known to be deficient. As noted above, higher standards will not single-handedly ensure compliance by owners of deficient dams under current regulations.	The Department continues to seek additional funding and positions for dam safety engineers. The Board is charged by the Dam Safety Act, § 10.1-604 et seq. of the Code of Virginia, to adopt regulations that ensure the safe design, construction, operation and maintenance of Virginia's impounding structures. In conducting this revision to the regulations, which were last reviewed comprehensively in 1989, the Board must be guided by its public safety mandate, and the regulations developed through this action seek to accomplish that end.
183	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	We recommend to the Board the following: make a distinction between existing and new dams, both in terms of the flexibility of applying the regulations and in recommending financial support of reengineering and alterations for existing dams (particularly in cases where the apparent risk from inundation has been increased by the pattern of zoning and development within the inundation area).	To "grandfather" existing structures would ignore the reality that public safety is not dependent upon the age of an impounding structure, but rather on its design and condition. The technical advisory committee that assisted with the development of the regulations considered the issue of setting different standards for old and new impounding structures, including grandfathering of existing structures. Following this discussion, it was determined that public safety interests mandated the equal treatment of all impounding structures. In order to allow for impounding structures that are in compliance with the Board's regulations to have time necessary to upgrade to the new standards contained in these regulations

			related to spillway design flood, section 125 does contain a delayed effective date provision that would permit these upgrades to be phased in over an 8 to 11 year period. Additionally, the language that was previously contained in section 130 of the regulations has been relocated to section 52, which contains the incremental damage analysis. This new section would allow the old section 130 process to be applied to all dams, including those constructed prior to 1982.
184	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	We recommend to the Board the following: Recommend public funding for private dams where the need for spillway modifications arises because of downstream and upstream development approved and abetted by local governments.	The Board's regulatory authority does not extend to regulation of downstream property owners. However, the Department is aware of the issue of downstream development affecting the hazard classification and associated spillway design requirements of dams. To that end, the Department has been recently working with numerous stakeholders on possible legislative solutions to this problem, and as a result, House Bill 837 has been introduced during this year's General Assembly. This bill would create responsibilities for developers of downstream development to contribute to upgrade costs, grant greater planning and zoning responsibilities to localities, and create notification responsibilities related to dam break inundation zones.
185	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	We recommend to the Board the following: develop a process to maintain an accurate and detailed account of all currently regulated dams and dams that should be regulated to ensure that dam owners are aware of the pending regulations.	The Department does maintain a database of dam owners. This database is continually updated and the Department is working to expand the database based on additional structures brought under regulation by changes in the Code of Virginia.
186	Charles de Seve (Lake Barcroft Watershed Improvement District) [See Note in 155]	We recommend to the Board the following: enlarge the focus of the analysis to flooding in general and compare the risk of flooding with the risk of inundation for each regulated dam. Dam safety should be considered in the larger context of flooding and overall risks to persons and property.	Incremental damage analysis is being made available to every dam owner by new section 52 of the regulations and considers flooding risks independent of the failure of a dam in comparison to risks created by the failure of a dam.
187	Charles de Seve (Lake Barcroft Watershed Improvement District)	A one PMF storm event would require Lake Barcroft's dam to withstand 59,000 cubic feet per second of water flowing not only over the primary and secondary spillways, but also over the	Requirements in the regulations that would cause the need for upgrades to impounding structures have been amended and it is believed that this amendment will result in significant cost

	[See Note in 155]	breadth of the entire dam structure. This would require redesign and reconstruction of the earthen embankment between the central masonry portion of the dam and the western shore and other modifications to dam structure, at a cost of approximately $20 million.	savings from the estimated cost of the regulations that were initially proposed by the Board. Additionally, whether a dam must be upgraded to the required spillway design flood may be dependant on the results of an incremental damage analysis. The estimates contained in the economic analysis for the proposed regulations were based on a national study on dam repair and upgrade costs 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". It was specifically recognized in the "significant qualifiers" portion of the economic analysis that these costs may have risen since the time of that report and may continue to rise over time. Other cost information, including dam break inundation zone mapping and incremental analysis, were developed through receiving estimates from various engineering firms that perform work on impounding structures in Virginia.
188	J. Eldon Rucker (Lake of the Woods Association, Inc.)	The proposed regulations involve a major philosophical issue. We believe the DCR/SWCB is pushing for a regulation that requires compliance with rigid standards (Table 1) with little room for cost consideration, engineering judgment, consideration of local conditions or common sense.	Engineering judgment remains an important consideration under the regulations and is specifically provided for in section 20. The regulations additionally contain flexibility in many areas, including the provision for an incremental analysis to be conducted by all dams. Additionally, the requirements contained in the regulations relating to spillway design flood standards have been amended. These amendments appropriately reduce standards for many dams from what the proposed regulations would have required.
189	J. Eldon Rucker (Lake of the Woods Association, Inc.)	Further, there is no provision for fiscally responsible cost benefit analysis and no defined process that an owner can follow in an attempt to demonstrate to DCR/SWCB that a dam does not pose an unreasonable hazard to life and property.	The regulations do permit the spillway design requirement for a dam to be reduced in cases where it can be shown that failure of the dam would not pose an additional downstream threat. This incremental analysis is contained in section 52. It is believed that this provision will allow reductions in spillway design requirements where

			engineering data can show that the reductions do not come at the cost of public safety.
190	J. Eldon Rucker (Lake of the Woods Association, Inc.)	It appears that the assumption is that if one human lives or works in the inundation zone, there will be probable loss of life and the dam is therefore a high hazard dam, whatever its size. This mind set will result in modification of almost every dam built before 1985, and many that were built after. I believe, as a matter of good public policy, the regulations should be targeting dams that clearly pose an unreasonable hazard to life and property and the regulations should provide a methodology for determining what is reasonable and unreasonable.	The technical advisory committee (TAC) that assisted with the development of the regulations considered the subject of whether or not one human life should be sufficient to cause a change in hazard classification. After discussion, it was determined that any loss of human life was unacceptable and that the regulations should take all actions necessary to ensure safety. The regulations do permit the spillway design requirement for a dam to be reduced in cases where it can be shown that failure of the dam would not pose an additional downstream threat. This incremental analysis is contained in section 52. It is believed that this provision will allow reductions in spillway design requirements where engineering data can show that the reductions do not come at the cost of public safety. The technical advisory committee that assisted with the development of the regulations considered the issue of setting different standards for old and new impounding structures, including grandfathering of existing structures. Following this discussion, it was determined that public safety interests mandated the equal treatment of all impounding structures.
191	J. Eldon Rucker (Lake of the Woods Association, Inc.)	Specifically, the regulations should continue to recognize that existing dams built before the enactment of the Dam Safety Act, may not satisfy current criteria, but should not be required to undergo costly and disruptive modifications to meet newly established standards unless it is clearly shown that without those modifications, they constitute an unreasonable hazard to life and property. In determining what constitutes an unreasonable hazard to life and property, I believe the regulations should provide specific criteria the Board should use in making the determination. Those criteria might include: (1) The structure is performing	The technical advisory committee (TAC) that assisted with the development of the regulations considered the issue of setting different standards for old and new impounding structures, including grandfathering of existing structures. Following this discussion, it was determined that public safety interests mandated the equal treatment of all impounding structures. The TAC also considered "Alternative 2", which was an alternative matrix for the required spillway design flood for dams. A subcommittee of the TAC met to discuss this concept specifically. After that subcommittee meeting, and a

		in accordance with its design and purpose (2) Operation and maintenance is satisfactory –(3) The approved EAP clearly demonstrates the capability for timely notification and evacuation of anyone in the inundation zone. (4) Plans exist to control development and/or minimize damage in the inundation zone. (5) A cost benefit analysis has been performed weighing the benefits of an increase in the SDF against the costs of modifying the spillway to accommodate a higher discharge (6) The owner satisfies all special requirements imposed by the Board	discussion of the full TAC, it was agreed that allowing considerations not related to the design and operation of the dam to influence the required spillway design standard would not be protective of public safety. Rather than "Alternative 2," the regulations permit the spillway design requirement for a dam to be reduced in cases where it can be shown that failure of the dam would not pose an additional downstream threat. This incremental analysis is contained in section 52. It is believed that this provision will allow reductions in spillway design requirements where engineering data can show that the reductions do not come at the cost of public safety.
192	J. Eldon Rucker (Lake of the Woods Association, Inc.)	Table 1 of the of the current regulations states that it was not the intention to establish rigid design flood criteria and "Safety must be evaluated in the light of peculiarities and local conditions for each impounding structure and in recognition of the many factors involved," again requiring the judgment of competent and experienced professional engineers. Unfortunately, statements such as these have been removed from the proposed regulations.	The regulations continue to recognize that engineering judgment is necessary and will be a large factor in determinations to be made. Subsection (E) of section 20 provides that "design, inspection and maintenance of impounding structures shall be conducted utilizing competent, experienced, engineering judgment that takes into consideration factors including but not limited to local topography and meteorological conditions." It is expected that engineering judgment will still be applicable to areas including, but not necessarily limited to, hazard classification (section 40) and incremental analysis (section 52).
193	J. Eldon Rucker (Lake of the Woods Association, Inc.)	In reviewing the proposed regulations and associated background information, it appears that a major objective of the new proposal is to remove the distinction between existing and proposed dams. One important aspect of the current dam safety regulations is recognition that judgment of competent professional engineers should weigh heavily into dam safety evaluations. Section 130 of the current regulations provides considerations for dams constructed prior to the enactment of the Virginia Dam Safety Regulations, including issuance of regular operation and maintenance certificates to dams that may not satisfy current criteria but do not pose an unreasonable hazard to life and property. Sound engineering	The regulations continue to recognize that engineering judgment is necessary and will be a large factor in determinations to be made. Subsection (E) of section 20 provides that "design, inspection and maintenance of impounding structures shall be conducted utilizing competent, experienced, engineering judgment that takes into consideration factors including but not limited to local topography and meteorological conditions." It is expected that engineering judgment will still be applicable to areas including, but not necessarily limited to, hazard classification (section 40) and incremental analysis (section 52).

		judgment on the part of competent professional engineers has been required to make these determinations.	
194	J. Eldon Rucker (Lake of the Woods Association, Inc.)	The Economic Impact Analysis by the Virginia Department of Planning and Budget dated May 4, 2007 states: "Thus the estimated total required spillway design upgrade costs would be $248,954,375." Based on actual cost data from Lake of the Woods and other recent dam work in the state, it is reasonable to expect the actual cost to modify the state's dams and those owned by local governments to the proposed regulation standards may well exceed this amount.	Requirements in the regulations that would cause the need for upgrades to impounding structures have been amended and it is believed that this amendment will result in significant cost savings from the estimated cost of the regulations that were initially proposed by the Board. The estimates contained in the economic analysis for the proposed regulations were based on a national study on dam repair and upgrade costs 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". It was specifically recognized in the "significant qualifiers" portion of the economic analysis that these costs may have risen since the time of that report and may continue to rise over time. Other cost information, including dam break inundation zone mapping and incremental analysis, were developed through receiving estimates from various engineering firms that perform work on impounding structures in Virginia.
195	J. Eldon Rucker (Lake of the Woods Association, Inc.)	It is stated that inundation zone maps average $16,417 and that the estimated cost for all dams would be $7.6 million. We have completed this task at a cost of $37,400 and believe that the estimate does not adequately reflect the real world. It is wasteful of economic resources to require expenditure of hundreds of millions of dollars without adequately assessing the specific risks involved.	Requirements in the regulations that would cause the need for upgrades to impounding structures have been amended and it is believed that this amendment will result in significant cost savings from the estimated cost of the regulations that were initially proposed by the Board. The estimates contained in the economic analysis for the proposed regulations were based on a national study on dam repair and upgrade costs 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". It was specifically recognized in the "significant qualifiers"

			portion of the economic analysis that these costs may have risen since the time of that report and may continue to rise over time. Other cost information, including dam break inundation zone mapping and incremental analysis, were developed through receiving estimates from various engineering firms that perform work on impounding structures in Virginia.
196	J. Eldon Rucker (Lake of the Woods Association, Inc.)	The proposed regulations do not appropriately consider current operating, maintenance, and emergency action plans for dams that have been in existence for a long period of time. The current spillway has adequately handled runoff for a 40 year period during which time a number of significant storm events have occurred. The proposed PMP event far exceeds any reasonable design requirement should be re- evaluated based on more reasonable assumptions (i.e. 500 or 1000 year events) or use of site-specific circumstances which appropriately consider actual risk.	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). The regulations do, however, contain an opportunity for a site-specific analysis to be completed. The incremental analysis is contained in section 52 of the regulations and allows for a reduction of the required spillway design flood where it can be shown that such a reduction will not cause an increased threat to life and property.
197	J. Eldon Rucker (Lake of the Woods Association, Inc.)	The statement on page 4145 of the proposed regulations, "there is insufficient data to accurately compare the magnitude of the benefits versus costs…" must be reconsidered. We as a nation compute risk of loss of life versus the cost to reduce that risk and make decisions daily in the automobile, aircraft, and drug industries. VDOT makes that trade off every time they size a culvert or decide on a traffic light. I believe that our state's promise of a "common-sense" and "fiscally responsible" approach to government strongly suggests a similar approach in the case of the proposed regulations.	The regulations are the result of the work of a technical advisory committee process that extended over a six-month period and included dam owners, consultants, localities, state and federal representatives, and others. Much discussion and analysis was completed during this process and during the process following the TAC that resulted in the economic impact analysis for the proposed regulations, as well as during the public comment period on the proposed regulations. It is believed that the final product of this work is a set of regulations that effectively meet the Board's mandate pursuant to the Dam Safety Act (§10.1-604 et seq.) to promote the safe design, construction, operation, and maintenance of Virginia's dams, while be cognizant of dam owner

			concerns and circumstances.
198	John S. Bailey (Lake of the Woods Association, Inc.)	Regarding storm durations, distribution models, etc., please make sure that we do not eliminate or place restrictions on any of the technical methods recognized by FEMA. This could apply to storm durations, as included in the proposed regulations. However, it could also include distribution models and other technical and non-technical criteria.	It is believed that the regulations do not limit any technical methods recognized by FEMA. FEMA references are permitted to be used by the regulations in section 330.
199	John S. Bailey (Lake of the Woods Association, Inc.)	It has been said that the creation of the Incremental Damage Assessment (IDA) is the same as the current Section 130, it is just putting into the regulations what the current practice is. However, the implementation of Section 130 is a far cry from how it used to actually work. Formerly, division staff would work jointly and creatively to resolve some of the more troublesome issues faced by dam owners and the results were not just the pouring of concrete. This seemingly is no longer the case. This is not a reflection on the expertise of staff, rather it is a comment on the limitations as to how public policy is being implemented.	The incremental analysis contained in section 52 is intended to make the Section 130 process available to all eligible dams as it has been implemented by current Dam Safety staff. The process adopted for the incremental analysis was approved by the technical advisory committee (TAC) that assisted with the development of the regulations, and the TAC did not agree to expand the incremental analysis to include other factors.
200	John S. Bailey (Lake of the Woods Association, Inc.)	Furthermore, the debate included discussion about whether or not specific IDA procedures should be incorporated into the regulations or be created as a set of internal guidelines to be used by staff and the respective dam owners. It was ultimately decided to not place them into the proposed changes. However, one technical element was included, that being water at 2 feet in depth and moving at a rate of 3 feet per second, and that seems to be the limit of the IDA factors to be considered. Why shouldn't other factors, such as those identified by the Ad-Hoc Committee also be included in the regulations? Without doing so, staff and dam owners have nothing to guide them.	The regulations have been revised to adopt the Rule of 7s in the incremental analysis, which specifies that an additional downstream threat to persons or property is presumed to exist when water depths exceed two feet or when the product of the water depth (in feet) and the average floodplain flow velocity (in feet per second) is greater than seven. The technical advisory committee that assisted with the revision of the regulations had extensive discussions concerning methods for reducing the spillway design flood requirements for a dam. In fact, a subcommittee of the TAC was established for the purposes of discussing an alternative design matrix. In the end, however, the TAC believed that it was not appropriate to consider factors that might not be protective of public safety.
201	John S. Bailey (Lake of the Woods Association, Inc.)	Conspicuously missing from the proposed regulations are any mechanisms that would provide for risk analysis, profiling, and/or ranking of dams. There are approximately 1,600	The technical advisory committee that assisted with the revisions of the regulations chose not to adopt a risk-based approach; rather, it is believed that all dams should be safe. Since the time

		impoundments in the Commonwealth that fall under the regulatory authority of DCR. Risk analysis profiling using systems that are already being used, such as by NRCS and as outlined in soon to be released FEMA documents, should be applied to all dams in the Commonwealth. Doing so would ensure that the limited funding available, for public and private dams, would be spent on those dams identified as requiring the most urgent of actions to protect public safety.	of the expansion of the number of dams subject to the Board's regulations due to a change to the Code of Virginia (2002), the Department has actively worked to accurately identify and assess regulated dams across the Commonwealth.
202	J. Eldon Rucker (Lake of the Woods Association, Inc.)	Lake of the Woods is concerned that the proposed revision of the regulations attempts to eliminate all risk associated with dam safety; however, it will, in fact, result in limited increase in safety but at a huge cost to Virginia taxpayers. The Administration needs to keep its early "Moving Virginia Forward" promise of a "common-sense and fiscally responsible approach to government. . . ."	It is recognized that upgrades and repairs to dams are often very expensive. The Dam Safety program, however, is tasked with ensuring the safe construction, operation and maintenance of the Commonwealth's dams through implementation of the Board's regulations. The changes made to the regulations are intended to minimize the costs associated with upgrades to dams to the extent possible while ensuring that an adequate level of public safety is maintained. It is of note that the required spillway design floods contained in Table 1 of section 50 have been significantly amended from the values contained in the proposed regulations. The changes made to the regulations additionally include the availability of an incremental damage analysis to all dams. This analysis allows the required spillway design of a dam to be reduced where it is shown that failure of the dam during a specific flood condition will not cause an additional downstream threat. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
203	J. Eldon Rucker	There continues to be a total avoidance	The regulations are the result of the work

	(Lake of the Woods Association, Inc.)	of risk philosophy by DCR. The *Virginia Register of Regulations* states on page 4145, "Implementation of these regulations will reduce such dam failures", and later on the same page, "There is insufficient data to accurately compare the magnitude of the benefits versus the costs for other changes." In plain English all this means is no one is willing to say how many dam failures they expect in the next few decades if the regulation is not changed and how many fewer would occur with the change. We as a nation compute risk of loss of life versus the cost to reduce that risk, and make decisions daily based on those calculations in the automobile, aircraft, and drug industries. VDOT makes that tradeoff every time they size a culvert or decide on a traffic light.	of a technical advisory committee process that extended over a six-month period and included dam owners, consultants, localities, state and federal representatives, and others. Much discussion and analysis was completed during this process and during the process following the TAC that resulted in the economic impact analysis for the proposed regulations, as well as during the public comment period on the proposed regulations. It is believed that the final product of this work is a set of regulations that effectively promote the safe design, construction, operation, and maintenance of Virginia's dams, while be cognizant of dam owner concerns and circumstances. It is recognized the uncertainties exist regarding the number of impounding structure failures that may occur in the future. As recognized by section 20(C), natural (including weather) and man-made (such as sabotage) events may never be completely planned for. Nevertheless, the Board is required to establish a Dam Safety program that is designed to protect lives and property to the maximum extent possible.
204	J. Eldon Rucker (Lake of the Woods Association, Inc.)	Proposed FEMA dam risk prioritization documents, provided by the Association of State Dam Safety Officials, state that there is a point where "risk has been reduced as low as reasonably practical [ALARP]. This reasonableness test reflects society's aversion to incidents that can potentially cause large loss of life but recognizes that there is a point of diminishing returns. ALARP is defined as the point where additional risk reduction is not possible without a disproportionate investment for the benefit gained."	The technical advisory committee (TAC) that assisted with the development of the regulations considered the subject of whether or not one human life should be sufficient to cause a change in hazard classification. After discussion, it was determined that any loss of human life was unacceptable and that the regulations should take all actions necessary to ensure safety.
205	J. Eldon Rucker (Lake of the Woods Association, Inc.)	There are significant benefits that are likely to exceed the costs related to a number of non construction actions including inspection and emergency action procedures, including evacuation. Clearly, the estimated $9 million price to dam owners to implement improvements to Emergency Action Plans and associated inundation zone mapping is cost-	It is agreed that upgrades to EAPs and dam break inundation zone mapping requirements will benefit public safety.

		effective. While Katrina left a bad reputation for "Evacuation", studies of dam failures and resulting damages indicate evacuation can be 98% effective.	
206	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-50 Proposed Change: Delete the phrase in paragraph A "or the dam is six feet or greater in height and creates a maximum impounding capacity of 50 acre-feet or greater." Comment and rationale This adds a new category of dams, which was not previously designated in Table 1 of the original regulation. This new category is significantly smaller than current dams excepted for agriculture purposes. This will add an undetermined number of dams, ranging between six and 25 feet in height, to the workload of the of the dam safety officials while agriculture dams of similar or larger dams are exempt from regulation. If this size structure is a safety issue, either both should be regulated If not, neither should be considered.	Notwithstanding the language contained in the current Table 1, the department has been regulating dams of the size noted by the comment since an amendment made to the Dam Safety Act (§10.1-604 et seq.) mandated regulation in 2002. Amending Table 1 to include such dams aligns the table with the remainder of the regulations and agency practice, and will not create an additional workload for the department.
207	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-50 Add the following: D. PMF: Probable Maximum Flood <u>represents the flood magnitude expected to be equaled on the average of once in 10,000 to one million years. It</u> is the flood that might be expected . . . . Comment and rationale: Since the flood magnitude is listed for the 100-Yr and 50-Yr floods, a similar number should be listed for the PMF. According to NOAA, the PMF is not expected to be exceeded.	It is believed that the proposed addition would be inappropriate, as there is no frequency for the PMF storm, which is the largest deemed probable to occur.
208	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-50 Proposed Change: Reinstate proposed deletion from Footnote D: "In some cases local topography or meteorological conditions will cause changes from the generalized PMP values; therefore, it is advisable to contact local, state or federal agencies to obtain the prevailing practice in specific cases." Comment and rationale:	Section 50 has been revised to include language similar to that requested by the comment. This language now provides, "In some cases, a modified PMF may be calculated utilizing local topography, meteorological conditions, hydrological conditions, or PMP values supplied by NOAA."

		Recommended in order to help put consideration of engineering judgment, local conditions and common sense into the proposed regulations.	
209	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC-50-20-40 Proposed Change: Add the following sentence to B.1 (and similar language to B.2 and B.3): "Probable" loss of life or "serious" economic damage will be determined after consultation with local county or municipal emergency planning officials with consideration given to probability of storm events and adequacy of emergency action plans and procedures.	While emergency action plans and coordination with emergency officials is intended to assist with preventing the loss of life in the event of an emergency at a dam, the dam's actual risk is dependent upon conditions determined by engineering considerations, and not by those of individuals and agencies. A definition of "probable loss of life" has been added to the regulations.
212	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC-50-20-40. Proposed Change: Add the following to paragraph D: No additional expansion of a spillway will be required unless the inflow is increased by more than 20%. Comment and rationale: To prevent unnecessary expenditures due to future dynamic changes in dam design criteria.	The department is aware of no basis for the suggestion that a 20% increase has no impact on public safety. Therefore, the suggested amendment has not been made.
213	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-50 Proposed Change**:** Set the maximum SDF for SIGNIFICANT hazard potential class at 0.5 PMF Comment and rationale: SDF should be based on hazard potential class, not size. Increasing Spillway Design Flood for class II dams to .75 PMF will make many of the currently acceptable class II dams out of compliance. The price to make this spillway increase will be in the hundreds of millions.	Table 1 has been amended to set the maximum SDF for significant hazard potential dams to 0.5 PMF.
214	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-50 Proposed Change: Retain Note C as written in current regulation, which reads, "The establishment in this chapter of rigid design flood criteria or standards is not intended. Safety must be evaluated in the light of peculiarities and local conditions for each impounding structure and in recognition of the many factors involved, some of which may not be precisely known. Such can only be done by competent, experienced engineering judgment, which the values	The regulations continue to recognize that engineering judgment is necessary and will be a large factor in determinations to be made. Subsection (E) of section 20 provides that "design, inspection and maintenance of impounding structures shall be conducted utilizing competent, experienced, engineering judgment that takes into consideration factors including but not limited to local topography and meteorological conditions." The standards set forth by Table 1 are believed to be the minimum necessary to

		in Table 1 are intended to supplement, not supplant." Comment and rationale: The key to safety is "competent, experienced engineering judgment which the values in Table 1 are intended to supplement, not supplant."	protect public safety. The regulations do, however, provide an opportunity for an incremental analysis to be conducted to reduce the spillway design flood requirement where it can be shown that public safety will not be harmed by such a reduction.
215	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-50 Proposed Change: Change the following sentence to read**, "**The hydrograph that creates the largest peak ~~outflow~~ inflow is to be used to determine capacity for nonfailure and failure analysis." Comment and rationale: Capacity should be determined by inflow hydrographs The computation of an inflow hydrograph is a function of the watershed characteristics, while an outflow hydrograph is both function of inflow and dam design, including reservoir characteristics, dam height, spillway characteristics, and gate(s) operating procedures. The setting of SDF design based on the outcome of that design is circular logic.	Inflow does not necessarily equate with peak pool elevation. In contrast, peak pool elevation will equate with peak outflow. The technical advisory committee that assisted with the development of the regulations discussed this topic and determined that peak outflow was the appropriate criteria.
216	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-52. Proposed change**:** Revise paragraph B.5. to read: "..the impounding structure as designed, constructed, operated and maintained does not pose an unreasonable hazard to life and property. Site-specific conditions may be recognized and considered. Conditions may be evaluated using approved criteria such as the Critical Design Flood Guidelines and other recognized agency guidelines." Comment and rationale: The proposed 4VAC50-52 Incremental Damage Assessment**,** does provide for reduction of the spillway design flood requirement, similar to the provisions of the existing 4VAC 50-20-130. However, it lacks a specific methodology. Examples include the "Ohio Critical Flood Guidelines" and the proposed "FEMA Users Manual: Prioritization of Dams Through Risk Categorization". ,	Subsection B of section 52 of the proposed regulations has been removed from the regulations. It is intended that site-specific conditions be considered in performing an incremental damage analysis. A statement recognizing this has been added to the new subsection B of section 52.
217	J. Eldon Rucker (Lake of the Woods	4VAC50-20-54. Proposed Change**:** Revise D.2. A dam	The requested amendments have been made to sections 54(D)(2) and (D)(3). A

	Association, Inc.)	break analysis utilizing ~~a probable maximum flood~~ the designed Spillway Design Flood (SDF) with a dam failure; and Revise D.3. A dam break analysis utilizing ~~a probable maximum flood~~ the designed Spillway Design Flood (SDF) without a dam failure. Comment and rationale: If the effects of failure using the designed hazard potential classification criteria for the dam (i.e. Significant Hazard Potential) meet the criteria outlined in 4VAC50-20-40 for loss of life or economic damage, then there is no reason to measure the effects of a higher level (PMF) flood.	requirement for a dam break analysis utilizing the probable maximum flood has been retained, however, in order to allow for accuracy in determining the hazard potential classification of an impounding structure, both under current conditions and in response to future development.
218	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-70. Construction permits. Proposed Change**:** Clarify B.6.g. Freeboard-normal pool to top of dam (feet). Comment and rationale: This definition of freeboard conflicts with the definition in 4VAC50-20-30, "the vertical distance between the maximum water surface elevation associated with the spillway design flood and the top of the impounding structure." This conflict also appears in other places.	Section 70(B)(7)(g) has been amended to eliminate this inconsistency.
219	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-125. Proposed Change**:** Change Paragraph A to read: A. If an impounding structure has been determined to have an adequate spillway capacity prior to the effective date of these regulations and is currently operating under a Regular or Conditional Operation and Maintenance Certificate, but will now require spillway modifications due to changes in these regulations, the owner shall submit to the board an Alteration Permit Application in accordance with 4VAC50-20-80 to address spillway capacity at the time of the expiration of their Regular or Conditional Operation and Maintenance Certificate or within three years of the effective date of these regulations, whichever is later. Comment and rationale: The schedule changes should apply to all dams. All dams are affected by the changes in spillway design regulations. Page 4147 of the Virginia Register of Regulations	Conditional certificates have been issued under the current regulations for dams that are in need of repair and/or upgrade regardless of the changes to the regulations proposed by this action, and it is not believed to be appropriate to grant a delayed effective date to these structures. For impounding structures that do not receive a delayed effective date, the Board will continue to utilize the existing conditional certificate process, which emphasizes progress by an impounding structure owner toward coming into compliance with regulatory standards. This process allows the particular situation of each impounding structure to be considered independently and for achievable timelines to be set.

		states, "Additionally, there are 39 dams that are currently noncompliant, (that means Conditional Certificate) as they already require a spillway upgrade, but the change in the regulations will require upgrading to a higher standard."	
220	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-165. Proposed Change: Delete this section. Comment and rationale: It is proposed that all dams, public, private, federal, state, agricultural and those authorized by the State Corporation Commission be subject to the same requirements. This will require modification of 10.1-604 of the Code of Virginia. This rationale assumes that the true purpose of the revised regulation is personnel and property safety.	As alluded to by the comment, the agricultural exemption is set forth in the Dam Safety Act (§10.1-604 et seq.), and removing that exemption would require a legislative action. The Board does not have the authority to remove the agricultural exemption through this regulatory action.
221	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-175. Proposed Change: Paragraph E. Delete "provide a critique of the exercise or exercises and any revisions or updates to the EAP or a statement that no revisions or updates are needed." Comment and rationale: Since no criteria is set for drills, no purpose is served by generating a critique for review at the State level. EAPs are best evaluated at the local level. Any required updates to the EAP is addressed in Paragraph D.	The requested amendment has been made to section 175(E). Dam owners are not required to provide a critique of exercises.
222	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-175. Proposed Change: Paragraph G.1. Delete "The notification chart shall include contact information providing 24-hour telephone coverage for all responsible parties." Comment and rationale: From a practical viewpoint, notification concerning a Stage III Condition (or Sunny day dam failure) will be through local 911 emergency agencies, which would be responsible for alerting the Virginia Department of Emergency Management and other similar organizations. It is unlikely that any dam owner would be able to maintain a current 24-hour list of non-local responsible parties such as the DCR staff.	Section 175 has been amended to clarify the parties intended to be contacted by the dam owner. The dam owner is responsible for developing a notification chart demonstrating how parties affected by a dam failure will be notified; local emergency management agencies may be a method of notification.

223	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-175. Proposed Change: Paragraph G.7. Change first sentence to read: The EAP shall include a section that identifies all parties with assigned responsibilities in the EAP pursuant to this subdivision 3 of this subsection. This will include certification that the EAP has been delivered to these parties. The preparer's name . . . Comment and rationale: From a practical viewpoint, it is unlikely that all of the agencies involved will provide signed receipts.	The requested amendment has been made to section 175(G)(7).
224	J. Eldon Rucker (Lake of the Woods Association, Inc.)	4VAC50-20-320. Proposed Change**:** Change Item 6 to read: "Other design and guidance procedures …" Comment and rationale: This should specifically include reference to other state guidance documents which have been found useful to dam safety programs. If Virginia does not provide for specific guidance for damage assessment, then successful procedures used by other states should be considered.	Guidance adopted by other states is specific to the regulations of those states and it would not be appropriate to assume that such guidance would apply to the Board's regulations. The regulations do provide for the utilization of manuals, guidance, and criteria utilized by the Federal Emergency Management Agency in section 330.
225	Lisa Cahill (Watershed Services)	Regarding the regulations, please provide the forms in such a way that they can be filled out on the computer. And on behalf of comments from engineering firms, including some sort of mail merge or way to fill the forms out in mass would be very helpful for those who may have twenty of these to do.	The Department recognizes this request and is working toward achieving technological advances in forms.
226	Lisa Cahill (Watershed Services)	What we learned in Gaston is that we can't rely on our infrastructure. An EAP may not be as effective as we think if we are relying on phone lines, power being present and roads. Because as reliable and as major a road as Route 301 is, it was completely breached in Gaston.	While effective EAPs will function to assist with the protection of individuals and property in an emergency situation, it is recognized that EAPs cannot be relied upon alone to protect public safety. Therefore, the regulations do require that dams be designed, constructed, operated and maintained in a manner that is protective of public safety.
227	Robert F. McCarty	These proposed regulations will increase the spillway design requirements to pass a greater storm flow than is currently required and these regulations would be applicable to all new impoundments, as well as, existing structures which now meet requirements. It is questionable	The spillway design flood requirements contained in section 50 of the regulations has been revised significantly from the values contained in the proposed regulation. Notwithstanding the language of the

		why these higher standards are required when, to my knowledge and research, there has not been a dam failure resulting in any fatalities since the Timberlake Dam failure in 1995 which claimed two lives.	version of section 50 that has been effective to date, the Board's practice has been to require the same spillway design flood standards of both old and new dams. The amended regulations reflect this practice. Further, the issue of whether there should be a distinction between new and existing dams was discussed extensively by the technical advisory committee that assisted with the development of these regulations. As public safety depends upon the design and condition of a dam, and not its age, it was determined by the TAC that such a distinction would be inappropriate.
228	Robert F. McCarty	Almost all of the required spillway design floods will exceed the 50-year design storm required for Interstate highway bridges over streams, which if washed out, would most probably result in more loss of life than an impoundment structure failure.	The Board's mandate pursuant to the Dam Safety Act (§10.1-604 et seq.) is to adopt regulations that provide for the safe design, construction, operation, and maintenance of Virginia's impounding structures. While other types of infrastructure, including highways, may be designed to criteria different than that required for impounding structures, the Board must set forth the requirements that it believes are necessary to carry out its mandate pursuant to the law.
229	Robert F. McCarty	Since the proposed regulations will retroactively apply to all of the nearly 1,700 regulated dams in the state this will require new hydraulic studies, engineering surveys, dam break analyses, incremental damage analyses, inundation dam break analyses and mapping, and hydrographs for 6, 12, and 24 hour duration design storms. All of these studies must be done by a licensed professional engineer. Considering that there are approximately 25,000 registered professional engineers in the Commonwealth, and less than 10 percent are practicing civil engineers of which very few have training or experience in conducting the above studies and analyses, it is questionable that there is enough engineering expertise to comply with the timeframe in the regulations.	It is believed that there will be sufficient engineering resources to cover the needs of dam owners. The Department does maintain a list of engineers and engineering firms that have expressed interest in working with dam owners in order to assist dam owners with securing engineering services.
230	Robert F. McCarty	It is unlikely that the small staff at the Dam Safety and Floodplain Management Division will be sufficient to adequately review all of the required documents, studies, and analyses in a timely manner.	It is believed that the Department has sufficient staffing to administer the Dam Safety Program under the revised regulations. Additionally, the Department continues to seek additional staffing for the Division of Dam Safety and Floodplain Management.
231	Robert F. McCarty	Based on recent estimates it could cost as	The estimates contained in the economic

		much as $20,000 to $25,000 just for the engineering costs related to each impoundment, which could amount to more than $36,000,000 if all impoundments have to be studied.	analysis for the proposed regulations were developed through receiving estimates from various engineering firms that perform work on impounding structures in Virginia.
232	Robert F. McCarty	Considering also, that these costs do not include the fees that would be established by the proposed regulations, this is a tremendous cost to the owners, counties, and localities responsible for these dams.	Fees have been established pursuant to the authority granted to the board by section 10.1-613.5 of the Code of Virginia. These fees are intended to cover the cost of a small portion of the administration of the Dam Safety program, and have been purposely set at levels that are believed to be as minimal as possible. In fact, the fee amounts provided for by the regulations have been further reduced from the values contained in the proposed regulations.
233	Robert F. McCarty	Dam owners and home owners associations are strapped with recent real estate taxes going up so much and will be resistant to any newly required expenditures of this magnitude. Most likely, little will be done unless some sort of funding can be made available.	It is recognized that upgrades and repairs to dams are often very expensive. The Dam Safety program, however, is tasked with ensuring the safe construction, operation and maintenance of the Commonwealth's dams through implementation of the Board's regulations. The changes made to the regulations are intended to minimize the costs associated with upgrades to dams to the extent possible while ensuring that an adequate level of public safety is maintained. The changes made to the regulations additionally include the availability of an incremental damage analysis (insert section number) to all dams. This analysis allows the required spillway design of a dam to be reduced where it is shown that failure of the dam during a specific flood condition will not cause an additional downstream threat. The Department continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.
234	Robert F. McCarty	4VAC50-20-54. E.2. appears to be a	The statement contained in section

		disclaimer clause. Is that the intent?	54(F)(2) has been amended to more accurately reflect the intention of the statement contained in that section.
235	Robert F. McCarty	Part VI covers fees for all permits and certificates with the exception of Alteration Permits. It is assumed that was intentional and not an oversight on the part of the Board.	The regulations establish no fee for an alteration permit. This was done intentionally in order to encourage the repair and upgrade of dams needing work.
236	Robert F. McCarty	I feel the proposed regulations go overboard in that they will retroactively increase design spillway flood requirements on existing impoundment structures and will require more studies and costs. It would make more sense to enforce existing regulations to get all existing dams into compliance and not burden the public with the tremendous cost that these proposed regulations would impose.	The Board is charged by the Dam Safety Act, § 10.1-604 et seq. of the Code of Virginia, to adopt regulations that ensure the safe design, construction, operation and maintenance of Virginia's impounding structures. In conducting this revision to the regulations, which were last reviewed comprehensively in 1989, the Board must be guided by its mandate. While it is recognized that many impounding structures still need additional work to become compliant with current requirements, waiting to adopt proper standards will do little more than cause these structures to undergo two upgrades instead of one (one in order to meet current standards, and then another to meet revised standards at a later date should the standard be increased). This would increase the overall burden to impounding structure owners. To assist impounding structure owners with compliance, the Department continues to seek additional staffing in order to provide additional outreach and guidance. The Department also continues to advocate for funding for the Dam Safety, Flood Prevention and Protection Assistance Fund to be made available to dam owners to assist with upgrades and repairs to their dams. The Fund was authorized to make financial assistance available to dam owners as a result of legislation passed during the 2006 General Assembly and an initial loan round is being conducted between December 1, 2007 and February 1, 2008.

All changes made in this regulatory action

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

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. Subsection F references the forms "called for" in this chapter.	In addition to the current requirements, it is required that any engineering analysis 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. Subsection F now references the forms "noted" in this chapter, as all forms formerly incorporated into the regulations by reference have been removed from the regulations. Recommended forms will be available from the Department but their usage will not be required.
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", "planned land use", "spillway", "stage I condition", "stage II condition", "stage III condition", "sunny day dam failure", and "tabletop exercise" 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".	Definitions or modifications to definitions are provided 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: a) The term "agricultural purpose" is defined as the production of an agricultural commodity that requires the use of impounded waters. 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. c) The term "alteration" is defined as set forth in the Dam Safety Act, § 10.1-604 et seq. of the

			Code of Virginia; a clarification is added, however, that the term "structural maintenance", as it is used in the definition, does not include routine maintenance. 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. 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. g) The term "Department" is defined to clarify its meaning when used in later sections. 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. 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. This term is used in later sections dealing with the development and maintenance of an emergency action plan. 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. Definition of this term is necessary for clarification and application to new section 4VAC50-20-175. 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. Definition of this term is necessary for clarification and application to new section 4VAC50-20-175. 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. 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. 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. 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. It was additionally noted that the term "dam" is equivalent to the term "impounding structure" in order to allow the two terms to be used interchangeably, as they are in practice. o) "Normal impounding capacity" has been replaced with "normal or typical water surface elevation." The new definition also adds clarifications regarding situations where the normal pool of the impoundment is different than the level at the lowest ungated outlet and regarding flood control/stormwater detention facilities. p) "Planned land use" has been defined to mean "land use that has been approved by a locality or included in a master land use plan by a locality, such as in a locality's comprehensive land use plan." Numerous public comments had requested this definition, as the term is used in the hazard classification section of the regulations. q) "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. r) "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. The term "failure" has been substituted from the term "breach" that appeared in the proposed regulation. s) "Sunny Day Dam Failure" is defined as the breaching of an impounding structure during normal conditions. This definition is based on current understandings and is included for clarification purposes. t) "Tabletop Exercise" is defined as a type of emergency action plan exercise. 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. There are no definitions at present for the terms, "probable loss of life", "may cause loss of life", and "no expected loss of life." There is currently no specific requirement that possible damages to agricultural interests be considered in determining an impounding structure's appropriate hazard categories. 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. Currently, current and projected downstream development must be considered in determining an impounding structure's hazard potential category.	The revised regulations contain the following amendments and additions: 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. Classification based on the size of a dam was also eliminated, as it is the threat to life and property posed by a dam, and not its size, that is appropriate to use in hazard classification. 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. 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. 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. e) To clarify what types of development must be considered in assigning hazard classification, the proposed hazard classification must also take into account present and planned land use for which a development plan has been officially approved by a locality in the dam break inundation zone rather than projected development, which may ultimately not occur. f) Definitions for the terms, "probable loss of life", "may cause loss of life", and "no expected loss of life" have been added to allow for more accurate hazard classifications. g) Qualifiers of "primary" and "secondary" utilities have been removed to allow impacts to utilities to be judged based upon their degree rather than the type of utility affected. h) Definitions for the terms "major roadways" and "secondary roadways" were added to increase clarity in hazard classification.
4 VAC 50-20-50		Table 1 contains spillway design flood standards that are used for impounding structures being constructed; as written, it does not specifically apply to existing impounding structures, although Board practice has	The following amendments and additions have been made to this section: 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

		been to utilize these standards in evaluating an existing impounding structure. 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. 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 (pre-1982) impounding structures only.	by the technical advisory committee, public safety is dependent upon the presence of an impounding structure and development within 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. 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, 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), that of all significant hazard potential structures to be engineered to pass .50 of the PMF, and that of all low hazard potential structures to pass the 100 year flood. Finally, a minimum threshold for the incremental damage analysis provided for in 4VAC50-20-52 was inserted for each hazard category. 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. c) As the size of an impounding structure is not determinative of the threat that it poses, size categories have been removed from the table. d) Table 1 stipulates that reductions to the established spillway design flood may be evaluated for all impounding structures using incremental damage assessment. 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. It is allowable, however, for a modified PMF to be calculated utilizing local topography, meteorological conditions, hydrological conditions, or PMP values supplied by NOAA when such a modification can be justified. 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. g) A note was added to subsection B advising dam owners that "due to potential for future development in the dam break inundation zone which would necessitate higher spillway design flood standards or other considerations, owners may find it advisable to consider a higher design flood standard than is required."

	4 VAC 50-20-51	Although this is a new section, Class IV impounding structures under the current regulations are in practice exempt from many requirements of the regulations.	This new section creates a series of special provisions related to certain low hazard dams, most of which were considered Class IV dams in the past. These provisions exempt such dams from many requirements of the regulations so long as they are certified as meeting the requirements of the section by a professional engineer. As these dams pose only a minimal threat, it is believed to be appropriate to exempt them from these requirements and such exemption will save costs for these dam owners.
	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.	This new section will: a) Allow for the potential reduction of the spillway design flood requirement through an incremental damage analysis. This is now applicable to all impounding structures. b) 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. c) Establish that an additional downstream threat to persons or property is presumed to exist when water depths exceed two feet or when the product of water depth (in feet) and flow velocity (in feet per second) is greater than seven. This is the Rule of 7s, which is utilized by other states. d) Specify that the spillway design flood shall not be reduced below the minimum threshold values as determined by Table 1. e) Provide that the required spillway design flood shall be subject to reclassification by the board as necessary to reflect changed conditions at the impounding structure and in the dam break inundation zone.
	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	This new section will: a) Set out dam break inundation zone mapping requirements. 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, and that maps be supplemented with water surface profiles. 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. d) For determining hazard potential classification,

		for an operation and maintenance certificate for an existing impounding structure prepare an emergency action plan which describes downstream individuals who will be affected by the failure of the impounding structure and includes methods for contacting them.	establish that the following shall be provided: sunny-day break analysis, a dam break analysis utilizing a spillway design flood with a structure failure; an analysis utilizing a spillway design flood without a structure failure; and a dam break analysis utilizing a probable maximum flood with a dam failure. e) Tie the mapping requirements to the emergency action plan requirements. f) Require that maps display downstream inhabited areas and structures, roads, public utilities that may be affected, and other pertinent structures within the identified inundation area for hazard classification and emergency planning purposes. g) Require that maps include a note that "The information contained in this map is prepared for use in notification of downstream property owners by emergency management personnel."
	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, it is specified 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 50-20-59	The size categories of impounding structures were contained in Table 1 of section 50.	As size is no longer considered in making a hazard potential classification, sizes categories of dams have been removed from Table 1 of section 50. Size categories remain useful, however, for categorization and reporting purposes, as well as comparison of dams across the Commonwealth and the United States. This new section recites these size categories so that they may be known and utilized by the regulated community.
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 a new impounding structure obtain a construction permit, the revised section will additionally: 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. 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. 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 revised section will: a) Incorporate authorities provided in the Code during the 2006 Session. 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. 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. 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. 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. 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. 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 revised section will: a) Incorporate authorities provided in the Code during the 2006 Session. b) Establish design report requirements. c) Establish plan of construction requirements including the requirements for a construction sequence with milestones and an E&S plan. 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. e) Specify that the work identified in the Alteration Permit must commence within the time frame identified in the Alteration Permit. 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. 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. 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. i) Clarify that an alteration permit is not needed for routine maintenance, as routine maintenance is not "structural maintenance."
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 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.	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. An optional form is available from the Department.
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	Repealed; incorporated into 4 VAC 50-20-105

		downstream.	
	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.	This new section on regular operation and maintenance certificates incorporates requirements of the existing sections and will: 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. 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 (suggested forms are available from the Department). 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. 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. 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. g) Specify that the owner of an impounding structure shall notify the Department immediately of any change in the use of the area downstream (including within the dam break inundation zone) 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	Repealed; requirements are incorporated into sections 4 VAC 50-20-70 and 4 VAC 50-20-80.

		constructed impounding structure to apply for a regular operation and maintenance certificate.	
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 new regulations, however, this section: 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. b) Specifies that this would only apply to impounding structures currently operating under a regular operation and maintenance certificate. 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. 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. 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. 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	Repealed; the provisions of this section are amended and incorporated into 4 VAC 50-20-52.

		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.	
4 VAC 50-20-140		This section 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 submits annual inspections and can demonstrate progress toward the repairs needed to the impounding structure.	While retaining much of the current section's provisions, the amendments: a) Update language used in the section to refer to conditional certificates for high, significant, and low hazard potential impounding structures. b) Clarify that conditional permits are "extended" and not "renewed".
	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 new section will specify 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 of the certificate. 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,	The revised regulations retain the requirements of the current section and additionally incorporate

		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 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 new section states 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 requirements and that he will comply with the terms and conditions of any permits/certificates.	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. An optional form is available from the Department.
	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, this new section will: a) Establish emergency action plan requirements for high and significant hazard potential impounding structures. 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, and resubmitted whenever updates are made to the plan. c) Require a drill to be conducted annually and a table-top exercise to be conducted every once

			every 6 years. d) Require owners to test existing monitoring, sensing, and warning equipment at remote or unattended impounding structures at least twice per year or as performed by the Va Dept. of Emergency Management pursuant to §10.1-609.1 of the Code of Virginia and maintain a record of such tests. 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 the dam owner representing that all parties with assigned responsibilities in the emergency action plan have been provided a copy of it. 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 certificate; the only explicit requirements for its contents, however, are contained in a form incorporated into the regulations by reference.	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, this new section imposes less strenuous emergency planning requirements upon this class of impounding structure. In all, this section: a) Creates new emergency preparedness 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		The current regulations	The amended section updates the language of the

50-20-180		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.	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 allows any owner aggrieved by an action taken by the Board or the Director without a hearing to demand a formal hearing.	In order to reflect the preferred method of the Board and the Department of making decisions pursuant to the Administrative Process Act (§ 2.2-4000 et seq. of the Code of Virginia) and to permit dam owners to seek decisions in a manner less costly than a formal hearing, the amended section allows an aggrieved owner to demand an informal fact-finding proceeding pursuant to § 2.2-4019 of the Code of Virginia. A formal hearing may still be held with the consent of the 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 revised section references 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," consulting "boards" was changed 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 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.	In addition to current provisions of this section, the revised section: a) References the Code section enacted during the 2006 General Assembly that discusses the designation of dams as unsafe. b) To allow for emergency situations to be addressed in a timely manner, specifies 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.	The revisions add "alteration" to the series of items for which a complaint could be filed.
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 revisions 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.	This section is repealed; 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 revised section notes the prohibition by § 10.1-609.2 of the Code of Virginia of trees and other woody vegetation in the emergency spillway area and that allowance of overtopping of a dam that is not designed to be overtopped is an example of an event that jeopardizes the safety of an impounding structure.
4 VAC 50-20-270		The current regulations contain requirements related to construction of principal spillways.	The revisions 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 regulations require all new impounding structures	The revised section retains the requirement for new dams to include a drain device, and

		to include a drain device; the characteristics of this device are determined by the owner's engineer, subject to the approval of the Director.	additionally requires that drains on existing dams be kept operational. In addition, where practicable, existing dams without drain devices should be retrofitted. The characteristics of the drain devices are to be determined by the owner's engineer; however, separate approval by the Director is no longer required (all plans and specifications of dams are already examined by the Department as part of the certificate and permit processes).
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 revised section clarifies that components must be durable and maintained or replaced in keeping with the design and planned life of the impounding structure. This reflects agency practice of requiring maintenance and 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 revised section clarifies 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 revised section contains 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 revised section contains 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 revised section adds additional Federal Emergency Management Agency references including but not limited to emergency action plans and inflow design floods to the list of acceptable references, as well as guidance issued by the Department.
	4 VAC 50-20-340	The current regulations contain no fees for permits or certificates issued by the Board. The Board is given the	This new section: a) Cites the authority for the Board to establish and collect application fees for the administration of the dam safety program, administrative review,

		authority to establish fees by § 10.1-613.5 of the Dam Safety Act.	certifications, and the repair and maintenance of impounding structures. b) Specifies 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.	This new section: a) Specifies 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. b) Sets 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.	This new section: a) Specifies 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. b) Specifies that there will be no fee assessed for the decommissioning of an impounding structure. c) Specifies that low hazard dams qualifying for the exemption provided by new section 51 of the regulations are exempt from fees.
	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.	This new section establishes the following construction permit fees: $2,500 for high or significant hazard potential impounding structures; and $1,000 for low hazard potential impounding structures.
	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.	This new section establishes the following 6-year regular operation and maintenance certificate fees: $600 for high hazard potential; $600 for significant hazard potential; and $300 for low hazard potential. Additionally, the fee for the extension of a Regular Operation and Maintenance Certificate is set at $250 per year or portion thereof.
	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.	This new section: a) Establishes a fee for a Conditional Operation and Maintenance Certificate for a period of more than one year but no more than two years of $300, and a fee for a Conditional Operation and Maintenance Certificate for a period of up to one year of $150. b) Establishes that the fee for the extension of a Conditional Operation and Maintenance Certificate is $250 per year or portion thereof. c) Specifies 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.

	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.	While there is no fee associated with the review of an incremental damage analysis, the new section provides that the department has the authority to charge costs in extraordinary cases where an outside consultant is hired to assist with the review (with the consent of the dam owner).
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. Recommended forms are available from the Department, and the Department will still utilize a public process to make substantial changes to the forms.

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 final 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 final regulations may be small businesses. In consultation with the technical advisory committee, it is believed that the final 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.

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 final 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.