

**Virginia Soil and Water Conservation Board**  
**Impounding Structure (Dam Safety) Regulations Technical Advisory Committee**  
**Wednesday, September 06, 2006**  
**Charlottesville, Virginia**

**Technical Advisory Committee Members Present**

Sara Bell, Dominion Generation  
William G. Browning, Department of Conservation and Recreation  
Scott Cahill, Watershed Services  
Paul D. Castle, Lakefront Royal Property Owners Association  
Jay R. Day, Mountain Castles Soil and Water Conservation District  
Donald R. Demetrius, Fairfax County  
J. Michael Flagg, Hanover County  
Joseph S. Haugh  
Connie Houston  
Richard Jacobs, Culpeper Soil and Water Conservation District  
David Krisnitski, Virginia Game and Inland Fisheries  
Mathew J. Lyons, Natural Resources Conservation Service  
Daniel J. Mahoney, Federal Energy Regulatory Commission  
Joseph H. Maroon, Department of Conservation and Recreation  
Duncan McGregor  
Timothy A. Mitchell, City of Lynchburg  
Mishelle R. Noble-Blair, City of Manassas  
David Ogle, Virginia Department of Transportation  
Peter Rainey, Lake of the Woods Association  
David Rosenthal, City of Norfolk  
Ray Scher, Caroline County

**Technical Advisory Members Not Present**

Connie Bennett, York County  
Steve Billcheck, Virginia Department of Emergency Management  
Jeff W. Booth, Western Virginia Water Authority  
David B. Campbell, Schnabel Engineering  
Douglas L. Davis, Waynesboro Police Department  
John W. Jones, Virginia Sheriffs Association  
John W. Peterson, KEMPS Consulting, Inc.

**Facilitator**

Barbara Hulburt, Director of Facilitation and Training, The McCammon Group

**DCR Staff Present**

Christine Watlington, Policy, Planning and Budget Analyst  
Michael R. Fletcher, Director of Development  
Jim Robinson, Dam Safety Program Manager  
Ryan Brown, Office of the Attorney General  
David Conniff, Dam Safety Engineer  
Rob VanLeir, Dam Safety Engineer  
Thomas Roberts, Dam Safety Engineer

**Observers Present**

Jan Allen, Virginia Commonwealth University  
John S. Bailey, Lake of the Woods Association  
Doug Rogers, Lake of the Woods Association  
Michael Woods, Troutman-Sanders  
Jerry Wright, Natural Resources Conservation Service  
Robert Cooper, Williamsburg Environmental Group

**Opening Remarks and Review of Agenda**

Ms. Hulburt called the meeting to order. She said that the goal for the meeting was to work through the agenda and the proposed draft. She said this would allow members to submit comments to DCR prior to the next meeting.

Ms. Hulburt said the process would be to go through the draft and ask for a consensus check among members.

**Review Minutes from July 27<sup>th</sup> Meeting**

Members were asked to send any comments or corrections regarding the minutes to Ms. Watlington at DCR.

Ms. Hulburt noted that Mr. Dowling was unable to attend the meeting and that Mr. Robinson would be reviewing the draft document. A copy of the discussion draft is included as Attachment #1.

**Refinement of Table 1 (Section 50)**

Mr. Robinson referred to the following draft of Table 1.

**TABLE 1--Impounding Structure Regulations**

Hazard Class of Dam <sup>2</sup>	SIZE CATEGORIES <sup>1</sup>		Spillway Design Flood (SDF) <sup>2</sup>
	Maximum Impounding Capacity (Ac-Ft)	Height(Ft)	
HIGH	All <sup>1</sup>	All <sup>1</sup>	PMF <sup>3</sup>
SIGNIFICANT	Large $\geq 50,000$ Medium $\geq 1,000$ & $< 50,000$ Small $\geq 15$ & $< 1,000$	$\geq 100$ $\geq 40$ & $< 100$ $\geq 6$ & $< 40$	PMF .50 PMF to PMF 100-YR to .50 PMF
LOW	Large $\geq 50,000$ Medium $\geq 1,000$ & $< 50,000$ Small $\geq 15$ & $< 1,000$	$\geq 100$ $\geq 40$ & $< 100$ $\geq 6$ & $< 40$	100-YR <sup>5</sup> 100-YR <sup>5</sup> 50-YR <sup>4</sup>

Mr. Robinson noted that there were quite a few changes in the table. Classes I-IV have been eliminated in favor of the terms High, Significant and Low.

Mr. Robinson noted that the High hazard should pass the PMF. DCR will still note the size for Significant and Low Hazard dams and under the SDF (Spillway Design Flood) will list the procedures for determining the SDF within the ranges.

Mr. Robinson said that Table 1 is essentially the first step in determining the SDF. All dam owners will be offered the opportunity to apply the incremental damage assessment. He noted that the first step would be to identify the maximum SDF.

He noted that in the Low category the ranges have been eliminated. The draft shows the 100-year for the large and medium and 50-year for the small.

Mr. Maroon noted that the original version of Table 1 was on page 6 of the discussion draft.

A member said that he had problems considering a large dam to be low hazard and asked the rationale for eliminating the half PMF.

Mr. Robinson said that came from previous TAC discussions.

Ms. Hulburt noted that in the discussion of low hazard dams the TAC agreed there would be no potential loss of life. The potential for damage is only to the property of the dam owner.

A member said he did not see any dams fitting into that category.

Mr. Robinson said that, under the current regulations, there were two low hazard dams that are 100 ft. or higher. However, he noted that those were mining dams and not under the DCR regulations.

The member said the problem was that there was no guarantee it would remain that way.

Ms. Hulburt asked for reactions from the group.

A member said that it appeared that the criteria for low hazard dams and the standards for the SDF had been reduced. He noted that they had been raised for the high.

A member expressed that the new table wasn't exactly what he would like to see, but noted that it was a great resolution. He noted that there is constantly a battle when looking at definitions and applying to the level of hazard presented by the dam. He noted that a low hazard dam assessed as low hazard would necessarily not threaten significant structures or human life. He said that, in that scenario, it would be appropriate to use the SDF.

A member expressed concern about whether a large dam could be low hazard.

Mr. Robinson said the draft refers to "no more than minimal economic damage."

A member said to go to a 100-year flood for dams that are higher than 100 ft. and hold more than 50,000 acre feet of water would be irresponsible.

Another member said that from the dam owner's perspective, it would be foolish not to put more in there.

A member suggested that the draft go back to the 100-year flood or the .5 PMF.

A discussion concerning edits to the SDF category for Low hazard dams occurred. The edits were as follows:

Large	.50 PMF
Medium	100 YR to .50 PMF
Low	50 YR

A member expressed concern about existing high hazard dams. He noted that the range for small high hazard dams had been eliminated and asked what happens to the existing dams that are already certified.

Ms. Hulburt said the delayed implementation section would be discussed elsewhere. She noted that it was different from the table in terms of grandfathering. She said this was a starting point but not the ending point.

Mr. Maroon noted that if the dam being regulated relates to stormwater then it would have to comply with higher regulations. He said that would have to be noted in the crosswalk between the two sets of regulations.

A member asked if this was the time to discuss the notes accompanying Table 1.

Mr. Robinson reminded members that an owner would have the option of going to the incremental analysis with the hope of lowering the SDF.

A member said that he did not understand the rationale for not picking a midpoint with the PMF.

Mr. Robinson asked that members email or contact DCR staff with additional suggestions and language.

A member asked if, on low hazard dams there was no significant loss of life or no significant property loss how much liability would be assumed. He asked why low hazard dams would be forced to upgrade to pass the PMF.

Ms. Hulburt said that the information as presented was for consideration between now and the next meeting.

Mr. Robinson said that the discussion would cover incremental analysis and that would hopefully address questions.

Mr. Robinson said that currently there were a little more than 300 dams in the Class III and IV categories. About 18 would be above the 100-year flood at this time. There are another 40 for which the classification is not known.

### **Discussion of Delayed Effective Date Language (Section 125)**

Mr. Robinson said that the intent in this section is to say allow a period of time for dam owners complete spillway upgrades if needed. Regular certificates would be replaced with conditional certificates.

He noted that if the five-year period is retained, DCR wants to ensure that the dam owner is not sitting back for five years doing nothing.

A member noted that, as this applies to all hazard classifications, high hazards would not have the opportunity to do incremental analysis.

Mr. Robinson said that no, if the dam owner was told the dam must pass the PMF, they would have to run the incremental analysis.

A member suggested that on line 845 “significant milestones” be replaced with “compliance schedule.”

It was noted that the date of 2012 was important, but that it will be extremely difficult to meet without financial resources available.

Mr. Robinson said the suggestion is to have the design work done so that construction can begin on or before January 2012. The work would not necessarily have to be completed by that date.

A member agreed that five year was a short time to complete the work. He noted that a municipality generally has a 30-year CAP program.

Ms. Hulburt noted that there was a tension between needing to upgrade dams to make them safe and the financial realities.

A member noted that it might take different methodologies than the normal procurement procedures.

A member said the engineering community may need to make some changes and that Dam Safety needs to do some serious educational work to make those changes. These upgrades may take years.

Another member said that the dam owner would not always know the time between submitting the application and completion. He suggested the Board and the dam owner work together to determine the completion time.

A member said that it was important to pick a time frame and that five years is reasonable.

A member noted that his concern was not about dams that are designed for SDF. He said the problem is for those dams where these regulations will be retroactive. He said that was not a long time to bring them to full PMF.

A member said the PMF standard in the table was the starting point. It may be that a high hazard dam can do an incremental analysis.

A member said that the five-year limit allows owners who already have a conditional certificate to come into the process. It is a good faith gesture.

A member expressed two concerns: 1) giving the dam owners minimum requirements, especially considering existing dam owners, and 2) ensuring that Dam Safety has the necessary verbiage included to be able to enforce the regulations.

The member said that Dam Safety must have the law behind them to do these things. He said he saw the language as drafted as very soft.

Ms. Hulburt said there was enforcement power there that was not there previously.

Mr. Maroon said that, from the DCR standpoint, the ability to have some way to move these new regulations and have some assurance of moving forward is important. He said that there needs to be a timetable.

A member said that the responsibility for public safety is a serious issue. He said that changes in the legislation could come about based on the TAC recommendations.

It was noted that the ultimate responsibility for enforcement action rests with the Board.

Staff noted that in some cases it was difficult to find the owner of the dam.

A member said that if there are truly dams that will affect life and property that the TAC would do a disservice to shortchange the discussion.

Ms. Hulburt asked if the TAC was comfortable with the notion of public safety and demanding that some type of timeline and conditional permits would be dealt with in the compliance schedule.

Ms. Hulburt suggested it would be helpful for the TAC to have information regarding the number of dams affected and that the expectations are.

Mr. Maroon said that the TAC said early on that for high hazard dams everything needed to be based on the full PMF. That is driving the discussion. However, while incremental analysis will adjust that downward there may still be a need to upgrade.

Ms. Hulburt said that there were two things under discussion. There is a need to look at structural integrity and it is not fair to people who have current certificates to be required to upgrade. She noted that was the intent of the delayed implementation.

A member said that the issue was not fairness, but what is right.

A member noted that the TAC has not said that all dams have to change to the full PMF. He noted that the federal guidelines say that the spillway capacity up to and including the full PMF does not constitute a hazard to life or property.

BREAK

Ms. Hulburt reaffirmed her earlier comments. She noted that the TAC had not had a great deal of time to review the draft. She noted that the language the TAC was about to review had not previously been discussed. She said there were changes to the incremental analysis the TAC has not reviewed.

Ms. Hulburt said she did not anticipate final closure with regard to this document at this meeting.

### **Review of Incremental Analysis Language (Section 54)**

Mr. Robinson walked through the discussion of incremental analysis.

He said that the issue was to see if the dam poses a hazard at the PMF. The primary question is if a dam fails at the full PMF would there be additional damage or would the majority of the damage already have occurred.

A member noted that he did not believe more could be done here than to use the FEMA guidelines.

Ms. Hulburt said that her understanding of incremental analysis was that: if a storm occurs and the storm is responsible for the destruction of five houses and there was no dam failure but if the dam failed and those same five houses were destroyed, incremental analysis would suggest there is no more destruction caused by the failure of the dam.

A member said the issue is to determine what size flood above which, if the dam failed, no additional damage would impact development.

A member said the issue is where does the incremental analysis stop.

A member said that it was important to note that structures being impacted by dam failure will likely cause loss of life.

A member asked a question regarding the figures listed in Section D, line 385.

Mr. Robinson said these numbers were a starting point for discussion purposes.

A member said that the subcommittee worked on incremental analysis and said that he believed the subcommittee had agreed to delete the need for a minimum threshold.

A member suggested deleting this section.

Another member said that a minimum threshold was needed for a high hazard dam. He said that with larger dams there are problems with an uncontrolled release of water.

A member said this is the same scenario where massive dams could potentially be classified as low hazard. He said the half PMF is a reasonable starting level.

A member said that if incremental analysis were showing damage at a higher level, he would not suggest doing incremental analysis.

A member said this was completely arbitrary. The height and basin size have nothing to do with the liability assumed by the reservoirs. He said this comes back to defining the classifications based solely on the liability assumed by the dam.

Another member noted that the proportional analysis does not take into account the damaged area.

A member said that if there is incremental analysis it is good to take out the proportional analysis.

Ms. Hulburt reviewed the suggestion that proportional analysis does not deal with damage and that incremental analysis should cover damage issues.

A member asked if that would eliminate the need for ranges in Table 1.

A member responded that if there is a minimum level for high hazard dams there is a reason to have the range.

A member asked how much it would cost a dam owner who had never run an incremental analysis. He asked if this was a requirement that would be a hardship.

Mr. Robinson said that, to get a reduction, the incremental analysis would have to be run.

A member said that he did not understand the debate between incremental and proportional. He noted that all the hazard classifications were based on damage and that incremental analysis takes into account the potential damage while proportionalizing does not.

A member said that, based on Table 1, the state will set forth the minimum acceptable public safety criteria. There are ranges for each of these. The proportional analysis is only used as an estimator to arrive at a minimum acceptable value. There is an option of using the proportional analysis or using the incremental analysis to get a reduction.

A member said that setting minimal acceptable public safety criteria goes with Table 1.

A member suggested that in line 385 the TAC say allowable reductions cannot flow below minimal reductions allowed in Table 1.

Ms. Hulburt asked if there would be no incremental analysis for high hazard dams.

She said there is the issue of proportionality, which is designed for DCR and dam owners to have a starting point between the ranges that exist. She said the issue was methodology.

Ms. Hulburt continued by asking if there was any sense of agreement in the TAC that it would be better to completely remove the notion of proportionalization.

A member said the way he read it was that the discussion was about using proportionality to determine the appropriate SDF

Ms. Hulburt noted that nothing about proportionalizing changes the ability to use the incremental analysis.

She said the question for the TAC was is there any value in the proportionalizing methodology and should this be included.

A member said the TAC needed to remember that this would apply to existing and to new dams.

A member said in the past there was no proportionality made. It was a judgment call.

A member said that the phrase "as determined by the director" should be added.

Mr. Maroon said that one aspect of the proportional analysis was cause for concern. He said the TAC was trying to do automatic sizing. He said that the starting point could go down, but not up. He said that there should be some predictability.

A member suggested that on line 250, the proportionalizing language be removed and replaced with engineering judgment with the appropriate numbers.

Another member said he supported that change. If there is history that the starting storm is below what has been experienced, DCR should be able to say that the spillway design flood cannot be reduced.

Ms. Hulburt suggested that the conversation be suspended and that DCR be allowed to review the discussions. She said that there is a cleanliness aspect to say that this is an engineering aspect. However, there is some sense that a proportional analysis might have a benefit and that the ability of DCR to increase those numbers should be explicit.

DCR staff will review and come back with recommendations at the next meeting.

A member said there needs to be an establishment of the minimum safety criteria that the state is willing to accept. The member suggested that if the judgment of DCR was to go

to the full PMF then the dam should be classified as high hazard. If there is that much at risk, the structure should be high hazard.

A member said the issue needs to be tied back to risk.

A member asked what the problem would be with leaving proportionalizing in and having DCR make the decision to run with higher numbers.

Ms. Hulburt said that DCR does not have the ability to do that. The question of public safety is the primary response to that.

A member asked if in reviewing this section, DCR could also look at Section D with regard to the minimum thresholds.

Mr. Maroon said this was a starting point for the discussion. He noted that he did not think that staff wanted to discuss the issue without more input. He said he heard three different suggestions: 1) no minimum cap, 2) set a half PMF, or 3) use Table 1 and 50% of what Table 1 allows.

Ms. Hulburt asked for feedback for DCR.

A member said the minimum threshold would be the low end in each hazard classification range.

Another member said to address public safety concerns that the PMF should be used for the high hazard and a different standard could be used for the low hazard in any type of proportional analysis. He said that for loss of life considerations the standard should be the full PMF.

A member said that he thought there were numerous states that allowed the inflow design flood for high hazard dams at half PMF. He said that if Virginia has half PMF as the minimum threshold, the use of proportional or incremental analysis to reach the minimum is not important.

A member noted that Virginia differs from many other states in terms of topography and rainfall.

At this time the committee took a break.

Ms. Hulburt reviewed potential dates for future meetings. Dates under consideration were October 27 and 31 and November 7. She noted that other members would be polled and that staff would forward the information regarding the date and location.

Ms. Hulburt noted that the October 11 meeting would be held at John Tyler Community College in Chester.

Ms. Hulburt reviewed the four areas under consideration:

- 1) No minimum threshold (incremental analysis can allow as large a reduction in the SDF as the engineering studies will allow)
- 2) 50% PMF – for high
- 3) 50% of the required #s in Table 1 – for significant and low
- 4) 50% PMF for high and the lowest number in the size range for significant (100 yr) and low (50 yr).

The TAC rejected the options 1 and 2.

There was not a strong consensus on option 3 or 4.

A member said that if there were minimum standards in the table, the incremental damage analysis reduction should not go below that.

A member asked why the TAC was discussing incremental damages for low hazard dams.

Ms. Hulburt said there were two things on the table.

- 1) Let the engineering analysis show what it shows. There would be no minimum threshold.
- 2) If there is a minimum threshold, why talk about incremental analysis.

A member asked that, since the TAC decided the larger of the low hazard dams had to pass a half PMF would those be required to do an incremental analysis.

DCR will draft a final version of the table and bring that back for TAC consideration.

A member noted that the regulation does not mention anything about environmental damage.

Ms. Hulburt said there were a lot of things that could be better or different. She said some may be things that members feel strongly enough about to raise as points of discussion. However, some can be raised by email or calls to DCR. She asked that members be clear that the items of discussion raised at the meetings were relevant enough to warrant discussion by the full TAC.

Ms. Hulburt asked if members could act on those two sections regarding incremental analysis before reviewing the final table.

A member said he could support the incremental analysis taking it back to the low end of the range. The low end could be approved by the Dam Safety office once the engineering is available to the Department.

Mr. Maroon said there was lots of uncertainty about where things should be. He acknowledged a wide range of opinion in the room. He said DCR recognizes and shares the large level of concern about public safety.

Mr. Maroon said there has to be value in setting a minimum threshold. There has to be something that the public can rely on. He said that DCR would consider the recommendations made by the TAC.

A member said there was a presumption that incremental analysis would bear out higher risk. He noted that any flood carries a potential loss of life and noted that the Commonwealth does not protect homes above the 100-year flood level. Recommendations from TAC been made and DCR will consider these recommendations.

A member noted that at a previous meeting the TAC had defined the 100-year as equivalent to the 0.2 PMF. He questioned the move to veer from that.

Ms. Hulburt said the question is whether it is possible to come up with an actual crosswalk between the 100-year and the PMF.

### **Review of Dam Break Inundation Zone Mapping Language (Section 52)**

Mr. Robinson reviewed the language in this section.

A member asked how a classification for a dam would be selected without doing an inundation study.

A member said this is where the new dam comes in with the question about hazard rating.

A member asked if PMF studies would have to be done to see if there would be loss of structures.

A member said this was for both the EAP (Emergency Action Plan) and for hazard classification.

Ms. Hulburt said that DCR could look at the issue of the nexus between a sunny day break and flood damage.

Mr. Roberts said that a sunny day breach is usually done at the crest of a spillway. If a dam is high hazard, it does not go beyond that.

Ms. Hulburt said that DCR would review the issue of sunny day failure.

A member said that he saw this as saying that low hazard dams require a simple map. But he noted that low hazard dams might need a more detailed map. He said in his opinion the classification and detailed map are two different things.

Ms. Hulburt said at earlier meetings there was a great deal of concern about requiring low hazard dams to pay for a detailed map. She said the sense of the group was that requiring a detailed inundation zone map would be inappropriate for small dam owners. A member suggested that instead of having a map, the requirement be what is acceptable to the director.

At this time the committee took a break.

#### **Discussion of Alternative Procedures (decision matrix) for SDF Reduction (Subcommittee Report)**

Ms. Watlington gave an overview of the report from the Alternative Procedures subcommittee.

She said that a number of issues were raised including purchase of downstream development, alarms and insurance to cover the cost of economic damages.

Ms. Watlington noted that the consensus of the subcommittee was that there did not need to be a change in the regulations with regard to alternative procedures.

The Department will develop an incremental fact sheet for owners to explore their options.

Ms. Watlington said that the recommendation of the subcommittee was that this section be removed. A summary of that conversation will be included minutes from the subcommittee meeting.

A member asked if this was a disconnect with the NOIRA.

Ms. Hulburt said that the NOIRA was intended to raise issues, but not determine the outcome.

Ms. Hulburt said there was not consensus on the issue and that will be reflected in the documents submitted with the proposed regulations.

A member said that it would be helpful to have at least a week to review paperwork prior to meetings.

### **Discussion of Dam Break Inundation Zone Draft Legislation**

Mr. Brown gave a review of the draft bill. A copy of the draft bill available from the Department.

Mr. Brown said the most useful way to address the draft legislation is to provide comments to Mr. Dowling or Ms. Watlington.

Mr. Maroon noted that the TAC was seeing this legislation for the first time. However, he said that the concepts were not new.

Mr. Brown said it was important to note this was a draft. He said that DCR is open to suggestions and comments regarding how to improve this.

Mr. Brown said that there was a lot of information dealing with notification and public disclosure. He said that another key component was the assumption of responsibility for dam repairs by developers and downstream owners as opposed to just the dam owners.

A member said the legislation was well drafted and supportable.

Another member said that the legislation referred to developers but not individual property owners. He said that it was important to be talking about downstream development. But he said that an individual homeowner would not be willing to invest the necessary funds to upgrade a spillway.

A member asked about a neighborhood where there is an inundation zone five miles away and the homeowners were not informed. What is the responsibility of the homeowner?

A member said there should be some added protection for existing structures whose owners were not notified.

Ms. Hulburt asked for suggestions about what could be done retroactively.

A member said that the 100-year inundation area should be treated like the flood inundation zone and that development should be prohibited.

A member asked how this would be dealt with when crossing jurisdictional boundaries.

A member suggested looking deeper into the requirements of the flood insurance program.

A member asked about the requirement for notification after the plan is approved and asked if they department should be involved in the approval.

Mr. Maroon said there are many changes made throughout the development process before a project is approved. He said DCR thought it would be practical to wait until the project is finally approved to determine any impacts.

The member gave the example of 3,500 lots being rezoned at the same time and asked if the Department would then tell the developer it was not a good or acceptable idea.

Mr. Maroon said the rest of the draft legislation would trigger some information for the locality and the developer.

A member said this was a good start and that it attempts to address the concern of the dam owners. However he said it involves several things that impact local government. He said he would like to submit further comments.

Mr. Maroon said it would be helpful to get comments back by September 13.

#### **Discussion of Emergency Repair Notification Issue/Language (Section 60)**

Mr. Robinson said this was the last piece to review.

On line 414, Mr. Robinson said this was a result of the discussion at the last TAC meeting regarding emergency repairs. The suggested language allows the owner or the owner's engineer to determine if there are emergency circumstances.

Ms. Hulburt said this addressed the concern that if the owner or engineer determines a problem the director would just have to be notified.

A member suggested saying "director or his designee."

Mr. Maroon noted that and said the references would be cleaned up.

A member asked about the 24 hours notification.

It was clarified that the notification would be within 24 hours of the discovery of a problem.

A member said the definition section should define "director or his designee."

A member suggested a 24-hour number for a dam emergency line that could be checked on a regular basis.

It was noted that the existing regulations say temporary repairs could not be initiated without the director's approval.

A member said that the hope would be that dam owners already have a relationship with a repair contractor that would allow the emergency repairs to be conducted.

Ms. Hulburt says this does not say who would do the repairs.

A member said that an adequate EAP should address problems about emergency notification and evacuation procedures for downstream residents.

Mr. Maroon said the staff tried to balance the distinction between imminent attention and imminent alteration.

Mr. Robinson asked members to get back to staff with suggested revisions.

#### **Emergency Preparedness for Low Hazard Dams.**

Ms. Hulburt referenced Section 177, Line 1034.

A member asked for clarification of the term "certification by owner" in line 1042.

Mr. Robinson said that currently the EAP is signed by the owner and the local E&S coordinator, indicating that the coordinator has received a copy and has received and read the plan.

A member suggested adding a sketch or a map.

#### **Class IV Dams**

Mr. Robinson said that currently there are Class VI dams that will be considered low hazard dams. These dams presently do not have to have an engineer, an inspection, forms or an EAP. Now these items will be required for low hazard dams.

A member said he would like to mitigate the costs for small dam owners. He said he would not want to dissuade people from building small reservoirs and dams.

A member said the question would be whether there would be non-regulated dams. Some of the small farm ponds will still not be regulated.

Mr. Robinson said these small dams would have to submit an operation and maintenance application.

A member asked if all Class IV dams moved to the low hazard category.

Mr. Robinson said there is an agricultural exemption.

A member said that once every six years is not too much to ask a dam owner to pay for an inspection by a professional engineer. This a safety issue.

### **Construction Permit Language and Alteration Permit Language**

Mr. Robinson said a construction permit would be required for any new dam. Any existing dam needing to be repaired would require an alteration permit.

He said the exception would be that if there is a dam failure on an existing dam, a construction permit would be needed to rebuild the dam.

Mr. Robinson said that the alternation permit was not previously covered in the existing regulations. DCR tried to mirror the construction permit in the draft suggested language.

### **Wrap Up**

Ms. Hulburt thanked members for their work. She reminded members to get comments regarding legislation to DCR by September 12 and comments regarding the regulations to DCR by September 15.

Attachment #1

**Version: Wednesday, September 6, 2006**  
**VIRGINIA IMPOUNDING STRUCTURE REGULATIONS (§ 4 VAC 50-20)**

**Part I: General**

**4VAC50-20-10. Authority.**

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

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

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

**4VAC50-20-20. General provisions.**

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

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

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

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

E. Design, inspection and maintenance of impounding structures shall be conducted utilizing competent, experienced, engineering judgment.

~~F.~~ The official forms as called for by this chapter are available from the **Department** director.

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

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

**4VAC50-20-30. Definitions.**

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

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

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

"Alteration" means changes to an impounding structure that could alter or affect its structural integrity. Alterations include, but are not limited to, changing the height or otherwise enlarging the dam, increasing normal pool or principal spillway elevation or physical dimensions, changing the elevation or physical dimensions of the emergency spillway, conducting necessary structural repairs or structural maintenance, or removing the impounding structure. Alterations do not include normal operation and maintenance.

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

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

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

"Construction" means the construction of a new impounding structure.

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

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

"Department" means the Virginia Department of Conservation and Recreation.

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

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

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

"Drill" means a type of emergency action plan exercise that tests, develops, or maintains 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 dam owner's response. A drill is considered a necessary part of ongoing training.

"Emergency Action Plan or EAP" means a formal document that recognizes identifies potential dam emergency conditions and specifies preplanned actions to be followed to minimize loss of life and property damage. The EAP specifies actions the dam owner must take to minimize or alleviate emergency conditions safety issues at the dam. It contains procedures and information to assist the dam owner in issuing early warning and notification messages to responsible emergency management authorities. It

shall also contain dam break inundation zone maps as required to show emergency management authorities the critical areas for action in case of emergency.

“Emergency Action Plan Exercise” means an activity designed to promote emergency preparedness; test or evaluate EAPs, procedures, or facilities; train personnel in emergency management duties; and demonstrate operational capability. In response to a simulated event, exercises consist of the performance of duties, tasks, or operations very similar to the way they would be performed in a real emergency. An exercise may include but not be limited to drills and tabletop exercises.

“Freeboard” means the distance between the maximum water surface elevation associated with the spillway design flood and the top of the impounding structure.

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

"Impounding structure" means a man-made ~~device~~ structure, whether a dam across a watercourse or other structure outside a watercourse, used or to be used to retain or store waters or other materials. The term includes: (i) all dams that are 25 feet or greater in height and that create an impoundment capacity of 15 acre-feet or greater, and (ii) all dams that are six feet or greater in height and that create an impoundment capacity of 50 acre-feet or greater. The term "impounding structure" shall not include: (a) dams licensed by the State Corporation Commission that are subject to a safety inspection program; (b) dams owned or licensed by the United States government; (c) dams ~~constructed, maintained or~~ operated primarily for agricultural purposes which are less than 25 feet in height or which create a maximum impoundment capacity smaller than 100 acre-feet; (d) water or silt retaining dams approved pursuant to §45.1-222 or §45.1-225.1 of the Code of Virginia; or (e) obstructions in a canal used to raise or lower water.

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

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

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

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

“Maximum impounding height” means the maximum retention height of an impounding structure. If the impounding structure spans a stream or watercourse, maximum impounding height means the vertical distance from the natural bed of the stream or watercourse measured at the upstream toe of the impounding structure to the top of the impounding structure. If the impounding structure does not span a stream or watercourse, maximum impounding height means the vertical distance from the lowest elevation of the inside limit of the barrier to the top of the impounding structure.

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

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

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

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

"Sunny Day Dam Failure" means the breaching of a dam caused by piping through an earthen embankment or appurtenance with the initial water level at the normal reservoir level, usually at the lowest ungated principle spillway elevation or the typical operating water level.

"Tabletop Exercise" means a type of emergency action plan exercise that involves a meeting of the dam owner and the state and local emergency management officials in a conference room environment. The format is usually informal with minimum stress involved. The exercise begins with the description of a simulated event and proceeds with discussions by the participants to evaluate the EAP and response procedures and to resolve concerns regarding coordination and responsibilities.

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

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

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

Historical Notes: Derived from VR625-01-00 §1.3, eff. February 1, 1989;

Amended, Virginia Register Volume 18, Issue 14, eff. July 1, 2002.

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

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

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

B. For the purpose of this chapter, hazards pertain to potential loss of human life or ~~property~~ damage to the property of others downstream from the impounding structure

in event of failure or faulty operation of the impounding structure or appurtenant facilities. Hazard classes of dams are as follows.

1. High Hazard Potential is defined where an impounding structure (dam) Impounding structures in the Class I hazard potential category are located where failure will cause probable loss of life or serious economic damage. Economic damage may include, but not be limited to, occupied building(s), industrial or commercial facilities, important primary public utilities, main highway(s) or major public roadways, railroad(s) railroads, personal property, and agricultural interests.

2. Significant Hazard Potential is defined where an impounding structure (dam) Impounding structures in the Class II hazard potential category are located where failure could may cause possible the loss of life or appreciable economic damage. Economic damage may include, but not be limited to, occupied building(s), industrial or commercial facilities, secondary public utilities, secondary public roadways, railroads, personal property, and agricultural interests, highway(s) or railroad(s) or cause interruption of use or service of relatively important public utilities.

3. Low Hazard Potential is defined where an impounding structure (dam) Impounding structures in Class III hazard potential category are located where failure would result in no expected loss of life and would cause no more than minimal economic damage. Economic change may include, but not be limited to, occupied building(s), industrial or commercial facilities, secondary public utilities, secondary public roadways, railroads or personal property, and agricultural interests may cause minimal property damage to others. No loss of life is expected.

4. Impounding structures in Class IV hazard potential category are located where the failure of the impounding structure would cause no property damage to others. No loss of life is expected.

5 C. Such size and hazard potential classifications shall be proposed by the owner and shall be subject to approval by the director. Present and ~~projected development of~~ planned land-use in the dam break inundation zones downstream from the impounding structure shall be considered in determining the classification.

6 D. Impounding structures shall be subject to reclassification by the Board as necessary.

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

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

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

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

1. licensed by the State Corporation Commission that are subject to a safety inspection program;
2. owned or licensed by the United States government;
3. operated primarily for agricultural purposes which are less than 25 feet in height or which create a maximum impoundment capacity smaller than 100 acre-feet;
4. water or silt retaining dams approved pursuant to §45.1-222 or §45.1-225.1 of the Code of Virginia; or
5. obstructions in a canal used to raise or lower water.

Impounding structures of regulated size and not exempted shall be constructed, operated and maintained such that they perform in accordance with their design and purpose throughout the life of the project. For ~~new~~ impounding structures, the spillway(s) capacity shall perform at a minimum to safely pass the appropriate spillway design flood as determined in Table 1 unless otherwise grandfathered pursuant to 4 VAC 50-20-130. For the purposes of utilizing Table 1, Maximum Impounding Capacity and Height shall be determined in accordance with the definitions provided in 4 VAC 50-20-30 and Hazard Classification shall be determined in accordance with 4VAC 50-20-40.

**TABLE 1--Impounding Structure Regulations**

Hazard Class of Dam <sup>±</sup>	Hazard Potential If Impounding Structure Fails	SIZE CLASSIFICATION CATEGORIES <sup>A</sup>		Spillway Design Flood (SDF) <sup>b ±c</sup>
		Maximum Impounding Capacity (Ac-Ft) <sup>a ±</sup>	Height(Ft) <sup>a ±</sup>	
<u>HIGH</u> I	Probable Loss of Life; Excessive Economic Loss	All <sup>B</sup>	All <sup>B</sup>	PMF <sup>5D</sup>
		Large ≥ 50,000	≥ 100	PMF <sup>e</sup>
		Medium ≥ 1,000 & < 50,000	≥ 40 & < 100	PMF
		Small ≥ 50 & < 1,000	≥ 25 & < 40	1/2 PMF to PMF
<u>SIGNIFICANT</u> H	Possible Loss of Life; Appreciable Economic Loss	Large ≥ 50,000	≥ 100	PMF
		Medium ≥ 1,000 & < 50,000	≥ 40 & < 100	1/2 <u>.50</u> PMF to PMF
		Small ≥ 50 <u>15</u> & < 1,000	≥ <u>25</u> <u>6</u> & < 40	100-YR to 1/2 <u>.50</u> PMF
<u>LOW</u> III	No Loss of Life Expected; Minimal Economic Loss	Large ≥ 50,000	≥ 100	1/2 PMF to PMF <u>100-YR</u>
		Medium ≥ 1,000 & < 50,000	≥ 40 & < 100	<u>7F</u>
		Small ≥ 50 <u>15</u> & < 1,000	≥ <u>25</u> <u>6</u> & < 40	100-YR <sup>2F</sup> to 1/2 PMF
				50-YR <sup>d-6E</sup> to 100-YR <sup>e</sup>
IV	No Loss of Life Expected; No Economic Loss to Others	≥ 50 -(non agricultural) ≥ 100 -(agricultural)	≥ 25 (both)	50-YR to 100-YR

2. Hazard classes of dams are as follows:

High Hazard Potential is defined where an impounding structure (dam) failure will probably cause the loss of life or serious economic damage to occupied building(s), industrial or commercial facilities, primary public utilities, major public roadways, railroads or personal property.

Significant Hazard Potential is defined where an impounding structure (dam) failure may cause the loss of life or appreciable economic damage to occupied building(s), industrial or commercial facilities, secondary public utilities, secondary public roadways, railroads or personal property.

Low Hazard Potential is defined where an impounding structure (dam) failure would result in no probable loss of life and would cause no more than minimal economic damage to occupied building(s), industrial or commercial facilities, secondary public utilities, secondary public roadways, railroads or personal property.

a 3B. The factor determining the largest size classification shall govern. The appropriate size category classification is determined by the largest size associated with the maximum impounding capacity and height of the impounding structure.

b 4C. The spillway design flood (SDF) represents the largest flood that need be considered in the evaluation of the performance for a given project. The impounding structure shall perform so as to safely pass the appropriate SDF. Where a range of SDF is indicated, the magnitude that most closely relates to the involved risk should be selected. proportionalize the height and maximum impounding capacity within the appropriate size classification and apply the maximum proportion within the SDF range to determine the appropriate SDF. Reductions in the established SDF may be evaluated through the use of incremental damage assessment pursuant to 4 VAC 50-20-54. The SDF established for an impounding structure shall not be less than those standards established elsewhere in the Code of Virginia or its attendant regulations including but not limited to design criteria for stormwater management facilities. The establishment in this chapter of rigid design flood criteria or standards is not intended. Safety must be evaluated in the light of peculiarities and local conditions for each impounding structure and in recognition of the many factors involved, some of which may not be precisely known. Such can only be done by competent, experienced engineering judgment, which the values in Table 1 are intended to supplement, not supplant.

e 5D. PMF: Probable Maximum Flood maximum flood. This means is the flood that might be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The PMF is derived from the current probable maximum precipitation (PMP) available from the National Weather Service, NOAA. In some cases local topography or meteorological conditions will cause changes from the generalized PMP values; therefore, it is advisable to contact local, state or federal agencies to obtain the prevailing practice in specific cases. Any deviation in the application of established developmental procedures must be explained and justified by the owner's engineer. The owner's engineer must develop PMF hydrographs for 6, 12, 24 hour durations. The hydrograph that creates the largest peak outflow is to be used to determine capacity for non-failure and failure analysis. Spillway integrity analysis will be based on the outflow hydrograph that most severely tests the

spillway's resistance to erosion. The owner's engineer must run the PMF for 6, 12 and 24 hour durations, using the inflow hydrograph that creates the largest peak inflow for non-failure and failure analyses. Present and planned land-use conditions shall be considered in determining the runoff characteristics of the drainage area.

~~d 6E.~~ 50-Yr: 50-year flood. ~~This means~~ represents the flood magnitude expected to be equaled or exceeded on the average of once in 50 years. It may also be expressed as an exceedence probability with a 2.0% chance of being equaled or exceeded in any given year. Present and planned land-use conditions shall be considered in determining the runoff characteristics of the drainage area.

~~e 7F.~~ 100-Yr: 100-year flood. ~~This means~~ represents the flood magnitude expected to be equaled or exceeded on the average of once in 100 years. It may also be expressed as an exceedence probability with a 1.0% chance of being equaled or exceeded in any given year. Present and planned land-use conditions shall be considered in determining the runoff characteristics of the drainage area.

B. When there is a road across the dam or below the dam, the classification of the dam shall take into account the following:

1. If the road is public, state maintained, or used by several families others than those specified in subsection B2, then the dam is to be classified at a minimum as a Significant (II) Hazard Class; and

2. If the road is private, not maintained by the state and only used by the owner, owner's family and guests then the dam is to be classified at a minimum as a Low (III) Class.

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

Historical Notes: Derived from VR625-01-00 §1.5, eff. February 1, 1989;

Amended, Virginia Register Volume 18, Issue 14, eff. July 1, 2002.

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

#### **4VAC50-20-52. Dam break inundation zone mapping**

A. The initial hazard classification shall be determined by a sunny- day dam break analysis utilizing the volume retained at the normal or typical water surface elevation of the impounding structure.

~~A.B.~~ All dam owners of High and Significant Hazard dams must provide dam break inundation maps representing the impacts that would occur should their dam fail. Such maps shall be provided to the locality or localities that would be impacted by a failure. The requirements for a dam break inundation map for High and Significant Hazard dams are as follows:

1. Maps shall be developed for both the sunny day failure condition and the Spillway Design Flood failure condition to show the expected extremes in peak water surface elevations, travel times of the front of the dam break flood wave to critical locations, and distances downstream between the two scenarios. Modeling of a sunny day failure shall consider that there would be no gate operations or procedures to assist in reducing the impacts of the failure in progress. Failure must consider that the full break

will include removal of the entire height of the embankment (width of breach may not include the entire embankment) in a time frame that represents the assumed integrity of the structure. If the dam is comprised of concrete, stone, masonry or other non-soil material then the failure would be a sudden failure of a slab or distinct defined portion of the structure. The extent of this failure may not include the entire height of the dam; however, the engineer must describe the reasoning of the final breach size to the satisfaction of the director. A sunny day failure must be modeled with the reservoir at normal pool and assuming that the total failure will take between 0.5 and 3 hours with a failure width of 0.5 to 2 times the height of the dam, and side slopes of less than 1 horizontal unit to 1 vertical unit and failure beginning when the reservoir is near the storm generated peak reservoir elevation. In the case of a "Sunny-Day" dam failure the inundation mapping should extend downstream of the dam to the location where the flood flows and flood wave are contained in the defined natural stream channel or blends into perennial wetted bottom lands with no associated property damage.

All other inundation mapping should extend downstream until the breach flood wave would be non-damaging of the dam to the location where loss of life or damage to property cannot be attributed to the dam failure and subsequent flood wave. The location of the end of the inundation mapping should be indicated where the water surface elevation of the dam break inundation zone and the water surface elevation of the spillway design flood during a non-dam failure event are within one foot of each other.

2. The map(s) shall be developed at a scale sufficient to graphically display downstream inhabited areas and structures, roads, and other pertinent structures on the map within the identified inundation area that may be subject to possible danger. To the maximum extent practicable, the inundation maps should be supplemented with water surface profiles at critical areas showing the water surface elevation prior to failure and the peak water surface elevation after failure. The list and telephone numbers of downstream residents, who would need to be evacuated, should whenever possible be plotted on the map, with their telephone numbers, for easy reference in the case of emergencies.

3. Since local officials are likely to use the maps for evacuation purposes, a note should be included on the map to advise that, because of the method, procedures, and assumptions used to develop the flooded areas, the limits of flooding shown and flood wave travel times are approximate and should be used only as a guideline for establishing evacuation zones. Actual areas inundated will depend on actual failure conditions and may differ from areas shown on the maps.

4. The maps shall be signed and sealed by a professional licensed engineer.

C. Low Hazard dams shall require a simple map demonstrating the general inundation that results from a dam failure. Such maps do not require preparation by a professional licensed engineer.

#### **4VAC50-20-54. Incremental damage assessment.**

A. When appropriate, the spillway design flood requirement may be reduced by the board in accordance with this section.

B. Prior to qualifying for a spillway design flood reduction, certain maintenance conditions must be adequately addressed including, but not limited to, the following:

1. Operation and maintenance is determined by the director to be satisfactory and up to date;

2. The dam is not in need of other alteration related to the integrity of the structure;

3. Emergency Action Plan requirements set out in 4 VAC50-20-175 or 4VAC50-20-177 have been satisfied;

4. Reporting requirements have been met and are considered satisfactory, by the director;

5. The applicant demonstrates in accordance with the current design procedures and references of 4VAC50-20-320 to the satisfaction of the Board that the impounding structure as designed, constructed, operated and maintained does not pose an unreasonable hazard to life and property;

6. The owner satisfies all special requirements imposed by the board: and

7. Certification by the owner that these conditions will continue to be met.

C. After meeting the criteria set out in 4VAC50-20-54B to the Director's satisfaction, the owner's engineer may proceed with evaluating the incremental damage analysis. Once the owner's engineer has determined the required spillway design flood through application of Table 1, further analysis may be performed to evaluate the incremental damage assessment. This assessment may be used to lower the spillway design flood. Allowable reductions are set out in subsection D, however, in no situation shall the reduction be less than the level at flood that would not cause additional death or property damage due to a dam failure over that which would occur without failure above which the incremental increase in water surface elevation downstream due to failure of a dam is no longer considered to present an unacceptable additional downstream threat. This analysis will require detailed computer modeling that produces water surface elevations at each structure that may be impacted downstream of the dam. Water depths greater than two feet and overbank flow velocities greater than three feet per second shall be used to determine impacts to persons or property. Water depth changes less than two feet and overbank flow velocities less than three feet per second may be considered as ineffective to structures downstream of the dam.

D. Allowable reductions are as follows:

1. For High Hazard and Significant Hazard dams, the allowable reduction shall not exceed a 25% reduction in the required spillway design flood.

2. For Low Hazard dams, the allowable reduction shall not result in a required spillway design flood below the 50-year flood.

(Idea of 2 year conditional for previously unregulated dams to "qualify" for incremental damage assessment)

#### **4VAC50-20-56. Alternative procedures (decision matrix) assessment.**

NOIRA placeholder: "establish an alternative procedure (decision matrix) which would allow for the evaluation of spillway design floods (SDF) less than the probable maximum flood (PMF) where there would be no unreasonable or significant increase in hazard to life and property"

#### **4VAC50-20-58. Local government notifications.**

For each certificate issued, the dam owner shall send to the appropriate local government office of planning and zoning a copy of the certificate, and a description and the maps required by 4VAC50-20-52 showing the area that could be affected by the dam breach. This notification would also serve to advise the locality that if development occurs in the dam break inundation zone that this could adversely affect the classification of the dam and require significant expenses to upgrade the dam.

## Part II: Permit Requirements

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

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

B. No person or entity shall alter or begin to alter an existing impounding structure ~~in a manner which would potentially affect its structural integrity~~ until the board has issued an alteration permit, ~~or in the case of an emergency, authorization obtained from the director.~~ If an owner or the owner's engineer have determined that circumstances are impacting the integrity of the dam, which could result in the imminent failure of the dam, in the case of an emergency, temporary repairs may be initiated prior to approval from the Director. However, the owner shall notify the Director within 24 hours. The permit requirement may be waived if the director determines that the alteration of improvement will not substantially alter or affect the structural integrity of the impounding structure. ~~Alteration does not mean normal operation and maintenance.~~

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

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

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

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

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

A. Prior to preparing the complete design report for a construction permit, applicants ~~are~~ shall submit the preliminary design report to the Department to determine if the project concept is acceptable to the Department. ~~encouraged to seek approval from the director. For this purpose the applicant should submit a~~ The preliminary design report should contain, at a minimum, a general description of ~~subdivisions~~ items 1 through 4 of subsection B of this section and subdivisions 1 and 2 of this subsection:

1. Proposed design criteria and a description of the size, ground cover conditions, extent of current development of the watershed, jurisdictional comprehensive planning

for development of the watershed, and the geologic and the geotechnical engineering assumptions used to determine the foundations and materials to be used.

2. Preliminary drawings of a general nature, including cross sections, plans and profiles of the impounding structure, proposed pool levels and types of spillway(s).

B. An applicant for a construction permit shall submit a design report on the official Department form forms. The design report shall be prepared in accordance with 4VAC50-20-240 and be consistent with the acceptable preliminary design report. The design report is a required element of a complete application and shall include the following information:

1. A description of the impounding structure and appurtenances and a proposed classification conforming with this chapter. The description shall include a statement of the purposes for which the impoundment and impounding structure are to be used.

2. A description of properties located in the dam break inundation zone downstream from the site of the proposed impounding structure, including the location and number of residential structures, buildings, roads, utilities and other property that would be endangered should the impounding structure fail.

3. A statement from the governing body of the local political subdivision or other evidence confirming that the body is aware of the proposal to build an impounding structure and that ~~of~~ the land use classifications are compatible with applicable to the dam break inundation zone.

4. Maps showing the location of the proposed impounding structure that include: the county or city in which the proposed impounding structure would be located, the location of roads, access to the site and the outline of the impoundment. Existing aerial photographs or existing topographic maps may be used for this purpose.

5. A report of the geotechnical investigations of the foundation soils or bedrock and of the materials to be used to construct the impounding structure.

6. Design assumptions and analyses sufficient to indicate that the impounding structure will be stable during its construction and during the life of the impounding structure under all conditions of reservoir operations, including rapid filling, flood surcharge, seismic loadings and rapid drawdown of the impoundment.

7. Evaluation of the stability of the reservoir rim area in order to safeguard against reservoir rim slides of such magnitude as to create waves capable of overtopping the impounding structure and confirmation of rim stability during seismic activity.

8. Design assumptions and analyses sufficient to indicate that seepage in, around, through or under the impounding structure, foundation and abutments will be reasonably and practically controlled so that internal or external forces or results thereof will not endanger the stability of the impounding structure.

9. Calculations and assumptions relative to design of the spillway or spillways. Spillway capacity shall conform to the criteria of Table 1.

10. Provisions to ensure that the impounding structure and appurtenances will be protected against deterioration or erosion due to freezing and thawing, wind and rain or any combination thereof.

11. Other pertinent design data, assumptions and analyses commensurate with the nature of the particular impounding structure and specific site conditions, including when

required by ~~the director~~ this chapter, a plan and profile of the dam break inundation zones.

~~12. Erosion and sediment control plans to minimize soil erosion and sedimentation during all phases of construction, operation and maintenance. Projects shall be in compliance with local erosion and sediment control ordinances.~~

~~13~~12. A description of the techniques to be used to divert stream flow during construction so as to prevent hazard to life, health and property. Such diversion plans shall also be in accordance with applicable environmental laws.

~~14~~13. A plan of quality control testing to confirm that construction materials and methods meet the design requirements set forth in the specifications.

~~15. A proposed schedule indicating construction sequence and time to completion.~~

~~16~~14. Plans and specifications as required by 4VAC50-20-310.

~~17. An emergency action plan on official forms developed in accordance with 4VAC50-20-175 and evidence that a copy the required copies of such plan has have been filed with the Department, the local organization for emergency management and the State Department of Emergency Management. The plan shall include a method of providing notification and warning to persons downstream, other affected persons or property owners and local authorities in the event of a flood hazard or the potential of impending failure of the impounding structure.~~

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

~~19. Placeholder for stormwater construction permit requirement language.~~

~~20. Placeholder for cultural and historic resources~~

C. The construction schedule is a required element of a complete application and shall include:

1. A detailed construction schedule that has been agreed to by the owner, engineer and contractor.

2. Elements of the work plan that should be considered include, but are not limited to, foundation and abutment treatment, stream or river diversion, excavation and material fill processes, phased fill and compaction, testing and control procedures, construction of permanent spillway and drainage devices.

3. The erosion and sediment control plan, as approved by the local government, which minimizes soil erosion and sedimentation during all phases of construction.

4. The stormwater management plan or stormwater management facility plan, as approved by the local government, if the impounding structure is a stormwater management best management practice

5. A detailed plan and procedures to maintain a stable impounding structure during storm events.

D. Temporary Emergency Action Plan is required element of a complete application and shall include:

1. A notification list of emergency response agencies, including any affected local governments:

2. A drawing showing temporary diversion devices:

3. Potential impoundment during the construction:

4. Provisions for notification of potentially affected residences and structures:

5. Construction site evacuation routes, and

6. Any other special notes particular to the project.

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

~~E. F. Within 120 days of receipt of an acceptable design report the board shall act on the application. If the application submission is not acceptable, the Director shall inform the applicant within 60 days of receipt and shall explain what changes are required for an acceptable application submission. A complete construction permit application consists of the following:~~

1. A final design report, submitted on the official Department form, with attachments as needed, and certified by the owner;

2. A Construction schedule which meets the requirements of subsection C above;  
and

3. A Temporary Emergency Action Plan which meets the requirements of subsection D above.

~~D. The owner shall certify in writing that the operation and maintenance construction plan as approved by the board will be adhered to during the life of the project except in cases of unanticipated emergency requiring departure therefrom in order to mitigate hazard to life and property. At such time In the case of an emergency, the owner's engineer, and the director, and other specified contacts shall be notified in accordance with the emergency action plan developed in accordance with 4VAC50-20-175.~~

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

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

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

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

~~H. I. Construction must commence within two years after the permit is issued. If construction does not commence within two years after the permit is issued, the permit shall expire, except that the applicant may petition the board for extension of the two-year period and the board may extend such period for good cause with an appropriately updated construction schedule and temporary emergency action plan.~~

~~J.~~ J. The director may ~~revoke a construction permit~~ issue a temporary stop work order pursuant to § 10.1-612.1 of the Code of Virginia and take any other action authorized by the Dam Safety Act (§ 10.1-604 et seq. of the Code of Virginia) if any of the permit terms are violated, or if construction is conducted in a manner hazardous to downstream life or property. ~~The director may order the owner to eliminate such hazardous conditions within a period of time limited by the order. Such corrective measures shall be at the owner's expense. The applicant may petition the board to reissue the permit with such modifications as the board determines to be necessary.~~

~~K.~~ K. The owner's licensed professional engineer shall advise the director when the impounding structure construction is complete and may safely impound water. If an Operation and Maintenance Application and an Emergency Action Plan meeting the requirements of 4VAC50-20-175 or 4VAC 50-20-177 have been received and approved, ~~the~~ The director shall issue a letter acknowledge this statement within 10 days, of receipt of the completion notification authorizing that ~~after which~~ the impoundment may be filled under the engineer's direction supervision. If the submission of an Operation and Maintenance Application or the Emergency Action Plan is not acceptable, the director shall inform the applicant within 10 days and shall explain what changes are required for an acceptable submission. The director's letter acknowledgement authorizing that the impoundment may be filled shall also act as a temporary operation and maintenance certificate, for a maximum of 150 days, until an a Regular Operation operation and Maintenance Certificate maintenance certieate has been applied for and issued in accordance with 4VAC50-20-110.

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

Historical Notes: Derived from VR625-01-00 §2.2, eff. February 1, 1989;

Amended, Virginia Register Volume 18, Issue 14, eff. July 1, 2002.

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

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

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

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

conducting necessary repairs or structural maintenance, or removing the impounding structure.

B.C. An applicant for an alteration permit shall submit a design report on the official Department form forms. The design report shall be prepared in accordance with 4VAC50-20-240. The design report and shall include, but not be limited to, the following information:

C. Where feasible an application for an alteration permit shall also include plans and specifications for a device to allow for draining the impoundment if such does not exist. Prior to receiving an Alteration Permit from the board the following information shall be provided to the Department:

1. A description of the proposed remedial work to be performed including a plan view of the dam site representing all significant structures and improvements that precisely illustrate the location of all proposed work.

2. A description of the benefits that the proposed remedial work will have on the dam.

3. Local government acknowledgement of alteration and repair plan.

4. Construction plans and specifications showing details of the proposed work.

5. Geotechnical investigations in the areas affected by the proposed alterations as necessary.

6. Design assumptions and analyses sufficient to indicate that the impounding structure will be stable during the alteration and during the life of the impounding structure under all conditions of reservoir operations.

7. Calculations and assumptions relative to design of the improved spillway or spillways, if applicable.

8. Provisions to ensure that the impounding structure and appurtenances involved in the alteration will be protected against deterioration or erosion due to freezing and thawing, wind, wave action and rain or any combination thereof.

9. Other pertinent design data, assumptions and analyses commensurate with the nature of the particular impounding structure and specific site conditions, including when required by this chapter, a plan and profile of the dam break inundation zones.

10. If applicable, a description of the techniques to be used to divert stream flow during alteration work so as to prevent hazard to life, health and property. Such diversion plans shall be in accordance with the applicable environmental laws and endorsed by the local code official.

11. A plan of quality control testing to confirm that materials used in the alteration work and the engineering methods used do meet the design requirements set forth in the specifications.

D. The alteration schedule shall include:

1. A detailed construction schedule that has been agreed to by the owner, engineer and contractor.

2. Elements of the work plan that should be considered include, but are not limited to, foundation and abutment treatment, excavation and material fill processes, phased fill and compaction, testing and control procedures, construction of permanent spillway and drainage devices, if applicable.

3. The erosion and sediment control plan, as approved by the local government, which minimizes soil erosion and sedimentation during all phases of construction.

4. A detailed plan and procedures to maintain a stable impounding structure during storm events, if applicable.

E. Within 120 days of receipt of a complete alteration permit application the acceptable design report the board shall act on the application. If the application submission is not acceptable, the Director shall inform the applicant within 60 days of receipt and shall explain what changes are required for an acceptable application submission. A complete alteration permit application consists of the following:

1. A final design report, submitted on the official Department form, with attachments as needed, and certified by the owner.

2. Alteration schedule which meets the requirements of subsection D above, and

3. Any necessary interim provisions to the current Emergency Action Plan.

Revisions shall be submitted to the local organization for emergency management, the Virginia Department of Emergency Management, and the Department.

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

E. Within 120 days of receipt of an acceptable application, the board shall act on the application. If the submission of required information is not acceptable, the director shall inform the applicant within 60 days and shall explain what changes are required for an acceptable submission.

F. Each alteration permit shall contain an expiration date that shall not extend past two years from the date of issuance. Within 120 days of original receipt of an acceptable design report for alteration the board shall act on the application.

F. During the alteration work the owner shall notify the director of any proposed changes from the approved design, plans, specifications, or alteration schedule work plan. Approval shall be obtained from the director prior to the construction or installation of any changes that will affect the integrity stability or impounding capacity of the impounding structure. If an owner or the owner's engineer have determined that circumstances are impacting the integrity of the dam, which could result in the imminent failure of the dam, in the case of an emergency, temporary repairs may be initiated prior to approval from the Director. However, the owner shall notify the Director within 24 hours.

G. The Alteration Permit shall be valid for the alteration schedule specified in the approved alteration permit application design report. The alteration schedule may be amended by the director for good cause at the request of the applicant.

H. Work identified in the Alteration Permit must commence with the time frame identified in the Alteration Certificate. If work does not commence within the prescribed time frame, the permit shall expire, except that the applicant may petition the board for extension of the prescribed time frame and the board may extend such period for good cause with an appropriately updated alteration schedule.

I. The director may issue a temporary stop work order pursuant to § 10.1-612.1 of the Code of Virginia and take any other action authorized by the Dam Safety Act (§ 10.1-604 et seq. of the Code of Virginia) if any of the permit terms are violated, or if construction is conducted in a manner hazardous to downstream life or property.

Statutory Authority: §10.1-605 of the Code of Virginia.  
Historical Notes: Derived from VR625-01-00 §2.3, eff. February 1, 1989.

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

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

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

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

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

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

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

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

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

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

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

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

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

H. The owner of any impounding structure shall meet the emergency action plan submittal requirements setout in ~~4VAC50-20-175 or 4VAC50-20-175.~~

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

Historical Notes: Derived from VR625-01-00 §3.1, eff. February 1, 1989.

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

A. Within ~~90~~ 180 days after completion of the construction of an impounding structure, the owner shall submit:

1. A complete set of as-built drawings certified by a licensed professional engineer and an as-built report on the Department form ~~official forms.~~

2. Certification ~~A copy of a certificate~~ from the licensed professional engineer who has inspected the impounding structure during construction ~~certifying that, to the best of his~~ 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.

3. ~~A copy of the operation and maintenance plan and emergency action plan submitted with the design report including any changes required by the director.~~

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

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

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

Historical Notes: Derived from VR625-01-00 §3.2, eff. February 1, 1989.

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

A. ~~Any owner of an~~ a High, Significant, or Low Hazard impounding structure ~~other than a Class IV impounding structure which has already filed an Inspection Report inventory report that does not have a~~ Regular Operation an operation and Maintenance Certificate ~~maintenance certificate~~ or any owner renewing a Regular Operation an

operation and Maintenance Certificate ~~maintenance certificate~~ shall file an application with the board.

B. The application for a Regular Operation ~~an operation and Maintenance Certificate~~ ~~maintenance certificate~~ shall be on the Department form ~~official forms~~ and shall include:

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

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

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

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

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

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

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

f. ~~Recommendations for remedial work.~~

32. The Operation and Maintenance Application, completed on the Department form, ~~An impoundment and impounding structure operation and maintenance plan~~ certified by a licensed professional engineer. ~~This plan shall place~~ Application places particular emphasis on operating and maintaining the impounding structure in keeping with the project design in such manner as to maintain its structural integrity and safety during both normal and abnormal conditions which may reasonably be expected to occur during its planned life. The Inspection Report ~~safety inspection report~~ required by the board should be sufficient to serve as the basis for the Operation ~~operation and~~ Maintenance Application ~~maintenance plan~~ for a Class I and II High, Significant, or Low Hazard impounding structure. ~~For a Class III impounding structure, the operation and maintenance plan shall be based on the data provided in the inventory report.~~

43. An Emergency Action Plan ~~emergency action plan~~ developed in accordance with 4VAC50-20-175 or 4VAC50-20-177 and evidence that ~~a copy~~ the required copies of such plan ~~has~~ have been filed with the Department, the local organization for emergency management and the State Department of Emergency Management. The plan shall include a method of providing notification and warning to persons downstream, other affected persons or property owners and local authorities in the event of a flood hazard or the potential or impending failure of the impounding structure.

C. The owner shall certify in writing in that the ~~Operation~~ operation and Maintenance Application ~~maintenance plan approved by the board~~ that operation and maintenance of the impounding structure will be adhered to during the life of the project except in cases of emergency requiring departure there from in order to mitigate hazard to life and property. ~~at which time the owner's engineer, and the director, and other~~

~~specified contacts shall be notified in accordance with the emergency action plan developed in accordance with 4VAC50-20-175.~~

D. ~~If the Operation and Maintenance Application or the Emergency Action Plan is found to be not acceptable, the director shall inform the applicant within 10 days and shall explain what changes are required for an acceptable submission. finds that the operation and maintenance plan or emergency action plan developed in accordance with 4VAC50-20-175 is deficient, he shall return it to the owner within 60 days with suggestions for revision to meet the specified minimum requirements.~~

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

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

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

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

#### **4VAC50-20-125. Delayed effective date for Spillway Design Flood requirements for certain impounding structures.**

~~Those impounding structures determined to have an adequate spillway capacity prior to (the effective date of these regulations?) January 1, 2007, and that hold a current certificate to operate (regular or conditional certificates) but due to changes in the spillway capacity requirements require spillway modifications, shall not be required to upgrade the spillway to the new spillway design flood requirements until January 1, 2012. However, those dams previously issued a regular certificate will be re-issued ~~now~~ require a conditional certificate until the new spillway design flood requirements are adequately addressed. If circumstances change during this delay effective period prior to January 1, 2012 that justify more immediate repairs to the impounding structure, the Board may direct alterations sooner. The issued conditional certificate may contain significant milestones including, but not limited to, the following:~~

~~1. Completion of the engineering studies necessary to determine upgrade requirements.~~

~~2. Completion of the design efforts.~~

~~3. Completion of the alteration permit application.~~

~~4. Completion of the alteration work.~~

~~During this delay period, dam owners are required to be working on plans to both upgrade their dam to the required spillway design flood requirements and also to address~~

~~other deficiencies that may exist that are not related to the SDF. A complete alteration permit application shall be submitted to the Department no later than January 1, 2012.~~

**4VAC50-20-130. Existing impounding Extension of Existing Operation and Maintenance Certificates Grandfathering of certain impounding structures constructed prior to July 1, 1982.**

~~A. High hazard dams that possess a valid operation and maintenance certificate and are less than 40 feet in size and have a required SDF of less than a PMF shall not be required to upgrade to a full PMF until such time as the impounding structure requires other alteration related to the integrity of the structure.~~

~~B. For impounding structures where the state has prior determined a required SDF value that is less than the higher value arrived at by proportionalizing the maximum impounding height and maximum impounding capacity within the appropriate size classification, shall not be required to upgrade to the proportionalized SDF value until such time as the impounding structure requires other structural repairs.~~

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

- ~~1. Operation and maintenance is determined by the director to be satisfactory and up to date;~~
- ~~2. The dam is not in need of other alteration related to the integrity of the structure;~~
- ~~3. Emergency Action Plan requirements set out in 4 VAC50-20-175 have been satisfied;~~
- ~~2 4. Annual owner's inspection reports have been consistently filed with, and are considered satisfactory, by the director;~~
- ~~3 5. The applicant proves in accordance with the current design procedures and references of 4VAC50-20-320 to the satisfaction of the board that the impounding structure as designed, constructed, operated and maintained does not pose an unreasonable hazard to life and property; and~~
- ~~4 6. The owner satisfies all special requirements imposed by the board.~~

~~B. When appropriate with existing impounding structures only, the spillway design flood requirement may be reduced by the board to the spillway discharge at which dam failure will not significantly increase the downstream hazard existing just prior to dam failure provided that the conditions of 4VAC50-20-130 A have been met.~~

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

Historical Notes: Derived from VR625-01-00 §3.4, eff. February 1, 1989.

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

The board may issue an operation and maintenance certificate for an impounding structure having a construction permit issued after July 1, 1982, and shall not require

~~upgrading to meet new more stringent criteria unless the board determines that the new criteria must be applied to prevent an unreasonable hazard to life or property.~~

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

Historical Notes: Derived from VR625-01-00 §3.5, eff. February 1, 1989.

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

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

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

C. A conditional certificate may be extended ~~renewed~~ in accordance with the procedures of 4VAC50-20-130 ~~4VAC50-20-120~~ provided that annual owner inspection reports are on file, and the board determines that the owner is proceeding with the necessary corrective actions.

D. Once the deficiencies are corrected, the board shall issue a ~~an~~ regular operation and maintenance certificate based upon meeting the requirements of 4VAC 50-20-100 ~~any required revisions to the original application.~~

E. The owner of any impounding structure, whether under conditional certificate or otherwise, shall meet the emergency action plan requirements set out in 4VAC50-20-175 or 4VAC50-20-177.

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

Historical Notes: Derived from VR625-01-00 §3.6, eff. February 1, 1989.

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

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

B. In accordance with § 10.1-609.2 of the Code of Virginia, 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.

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

Historical Notes: Derived from VR625-01-00 §3.7, eff. February 1, 1989.

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

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

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

Historical Notes: Derived from VR625-01-00 §3.8, eff. February 1, 1989.

#### **4VAC50-20-175. Emergency Action Plan for High and Significant Hazard Dams.**

A. In order to minimize the loss of life and property damage during potential emergency conditions at a dam, and to ensure effective, timely action is taken should a dam emergency occur, an EAP shall be required for each impounding structure. The EAP emergency action plans shall be coordinated with the Department of Emergency Management in accordance with §44-146.18. The EAP plans required by these regulations shall be incorporated into local and inter-jurisdictional emergency plans pursuant to §44-146.19.

B. It is the dam owner's responsibility to develop, maintain, **exercise**, and implement a site-specific EAP.

C. An EAP shall be submitted every six years. For a High or Significant hazard impounding structure, the EAP shall be submitted with the dam owner's renewal of their **regular** operation and maintenance certificate application.

D. It is imperative that the dam owner furnish all holders of the EAP **section** updates to the EAP immediately upon becoming aware of necessary changes to keep the EAP workable. Should a dam be reclassified, an EAP ~~emergency action plan~~ in accordance with this section shall be submitted.

E. A drill shall be conducted annually for each **High or Significant** hazard impounding structure. A table-top exercise shall be conducted once every 3 years. Owners shall certify to the Department annually that an exercise has been completed and the statement shall include a critique of the exercise and any revisions or updates to the EAP ~~plan~~ or a statement that no revisions or updates are needed.

F. Dam owners shall test existing monitoring, sensing, and warning equipment at remote/unattended dams at least twice per year and maintain a record of such tests.

G. An EAP shall contain the following seven basic elements unless otherwise specified in this subsection.

1. Notification chart - A notification chart shall be included for all classes of dams that shows who is to be notified, by whom, and in what priority. The notification chart shall include contact information that assures 24-hour telephone coverage for all responsible parties.

2. Emergency Detection, Evaluation, and Classification - The EAP ~~plan~~ shall include a discussion of the procedures for timely and reliable detection, evaluation, and

classification of an emergency situation to ensure that the appropriate course of action is taken based on the urgency of the situation. Where appropriate, the situations should address dam breaks that are imminent or in progress, a situation where the potential for dam failure is rapidly developing, and a situation where the threat is slowly developing.

3. Responsibilities – The EAP plan shall specify a determination of responsibility for EAP-related tasks. The EAP shall also clearly designate the responsible party for making the decision that an emergency condition no longer exists at the dam.

4. Preparedness – The EAP plan shall include a section that describes preparedness actions to be taken both before and following development of emergency conditions.

5. Dam Break Inundation Maps – The EAP plan shall include an inundation map that delineates the areas that would be flooded as a result of a dam failure. All properties identified within the dam break inundation zone shall be incorporated into the EAP’s dam break inundation zone map to ensure the proper notification of persons downstream and other affected persons or property owners in the event of a flood hazard or the impending failure of the impounding structure. Such maps shall be developed in accordance with 4VAC50-20-52.

6. Appendices - The appendices shall contain information that supports and supplements the material used in the development and maintenance of the EAP such as analyses of dam break floods; plans for training, exercising, updating, and posting the EAP; and other site-specific concerns.

7. Certification – The EAP plan shall include a section that is signed by all parties involved(with assigned responsibilities) in the EAP plan, where they indicate their approval of the EAP plan and agree to their responsibilities for its execution. The preparer’s name, title, and contact information shall be printed in this section. The preparer’s signature shall also be included in the certification section.

Table 2: Emergency Action Plan Requirement Summary **IS THE TABLE NEEDED NOW???**

<u>Hazard Class</u>	<u>Notification Chart</u>	<u>Emergency Detection, Evaluation, and Classification</u>	<u>Responsibilities</u>	<u>Preparedness</u>	<u>Dam Break Inundation Maps</u>	<u>Appendices</u>	<u>Certification</u>	<u>Drill</u>	<u>Table Top Exercise</u>
<u>High</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>
<u>Significant</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>
<u>Low</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	

H. The development of the EAP shall be coordinated 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. Consultation with state and local emergency management officials at appropriate levels of management

responsible for warning and evacuation of the public is essential to ensure that there is agreement on their individual and group responsibilities.

I. The EAP shall at a minimum be filed with the Department, the local organization for emergency management, and the State Department of Emergency Management. Two copies shall be provided to the Department.

J. The (Department form) following format shall be used as necessary to address the requirements of this section.

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#### **4VAC50-20-177. Emergency Preparedness for Low Hazard Dams.**

A. Low Hazard Dams shall provide information for emergency preparedness to the Department, the local organization for emergency management and the Virginia Department of Emergency Management. The information shall include, but not be limited, to the following:

1. Current contact name and contact information, including phone number;

2. Physical location of the dam;

3. A procedure for notifying any downstream properties potentially impacted by the dam's failure; and

4. Certification by the owner and the local organization for emergency management.

### **Part IV: Procedures**

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

A. The director may make inspections during construction, alteration or operation and maintenance as deemed necessary to ensure that the impounding structure is being

constructed, altered or operated and maintained in compliance with the permit or certificate issued by the board. During the maintenance, construction, or alteration of any dam or reservoir, the director shall require the owner to perform, at the owner's expense, such work or tests as necessary to obtain information sufficient to enable the director to determine whether conformity with the plans and specifications approved by the certificate is being secured. The director shall provide the owner a copy of the findings of these inspections. This inspection does not relieve the owner from the responsibility of providing adequate inspection during construction or operation and maintenance.

B. Periodic inspections during construction or alteration shall be conducted under the direction supervision of a licensed professional engineer who shall inspect in accordance with the construction or alteration permit issued by the Board propose the frequency and nature of the inspections subject to approval by the director.

C. Required Periodic inspections during operation and maintenance shall be conducted under the supervision of a licensed professional engineer at an interval not greater than that required to update the operation and maintenance certificate. At a minimum, an annual owner's inspection shall be conducted when a professional inspection is not required.

D. Every owner shall provide for an inspection by a licensed professional engineer after overtopping of the impounding structure or flows cause significant damage to the emergency spillway. A copy of the findings of each inspection with the engineer's recommendations shall be filed with the board within a reasonable period of time not to exceed 30 days subsequent to completion of the inspection.

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

Historical Notes: Derived from VR625-01-00 §4.1, eff. February 1, 1989.

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

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

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

Historical Notes: Derived from VR625-01-00 §4.2, eff. February 1, 1989.

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

~~Any owner refusing to obey any order of the board or the director pursuant to this chapter may be compelled to obey and comply with such provisions by injunction or other appropriate remedy obtained in a court proceeding. Such proceeding shall be instituted by the board or in the case of an emergency, by the director in the court which granted approval to the owner to impound waters or, if such approval has not been granted, the proceeding shall be instituted in any appropriate court. Enforcement of the provisions of this chapter shall be in accordance with the provisions of the Dam Safety Act (§ 10.1-604 et seq. of the Code of Virginia).~~

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

Historical Notes: Derived from VR625-01-00 §4.3, eff. February 1, 1989.

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

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

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

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

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

Historical Notes: Derived from VR625-01-00 §4.4, eff. February 1, 1989.

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

A. No owner shall ~~have the right to maintain an unsafe impounding structure which unreasonably threatens the life or property of another person. The owner of any impounding structure found to have deficiencies which could threaten life or property if uncorrected shall take the corrective actions needed to remove such deficiencies within a reasonable period of time.~~ Designation of an impounding structure as unsafe shall be made in accordance with § 10.1-607.1 of the Code of Virginia.

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

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

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

Historical Notes: Derived from VR625-01-00 §4.5, eff. February 1, 1989;

Amended, Virginia Register Volume 18, Issue 14, eff. July 1, 2002.

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

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

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

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

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

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

**Part V: Design Requirements**

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

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

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

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

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

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

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

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

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

The minimum design flood to be utilized in impounding structure evaluation, design, construction, operation and maintenance shall be commensurate with the size and hazard potential of the particular impounding structure as determined in 4VAC50-20-50 and Table 1.

Competent, experienced, professional engineering judgment by a licensed professional engineer shall be used in applying those design and evaluation procedures referenced in 4VAC50-20-320 of this chapter.

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

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

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

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

**B. An emergency spillway shall be required.**

C. Vegetated earth or an unlined emergency spillway may be approved when the applicant demonstrates that it will pass the spillway design flood without jeopardizing the safety of the impounding structure. In no case, however, shall dam owners permit the growth of trees and other woody vegetation in the emergency spillway area.

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

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

Historical Notes: Derived from VR625-01-00 §5.3, eff. February 1, 1989.

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

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

1. That control gates and structures are suitably designed to operate reliably under maximum heads for durations likely to be involved and risks of blockage by debris are minimal;

2. That access roads and passages to gate regulating controls would be safely passable by operating personnel under spillway design flood conditions; and

3. That there are no other substantial reasons for concluding that outlets would not operate safely to full design capacity during the spillway design flood.

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

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

D. If intakes to regulating outlets are likely to be exposed to dangerous quantities of floating ~~drift~~ debris, sediment depositions or ice hazards prior to or during major floods, the dependable discharge capability during the spillway design flood shall be assumed to be zero.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

A. Flood routings shall start at or above the elevation of the crest of the lowest ungated outlet. **Freeboard determination and justification must be addressed by the owner's engineer.**

B. All elements of the impounding structure and impoundments shall conform to sound engineering practice. Safety factors, design standards and design references that are used shall be included with the design report.

C. Inspection devices may be required by the director for use by inspectors, owners or the director in conducting inspections in the interest of structural integrity during and after completion of construction and during the life of the impounding structure.

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

Historical Notes: Derived from VR625-01-00 §5.7, eff. February 1, 1989.

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

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

1. The name of the project; the name of the owner; classification of the impounding structure as set forth in this chapter; designated access to the project and the location with respect to highways, roads, streams and existing impounding structures and impoundments that would affect or be affected by the proposed impounding structure.

2. Cross-sections, profiles, logs of test borings, laboratory and in situ test data, drawings of principal and emergency spillways and other additional drawings in sufficient detail to indicate clearly the extent and complexity of the work to be performed.

3. The technical provisions, as may be required to describe the methods of the construction and construction quality control for the project.

4. Special provisions, as may be required to describe technical provisions needed to ensure that the impounding structure is constructed according to the approved plans and specifications.

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

Historical Notes: Derived from VR625-01-00 §5.8, eff. February 1, 1989.

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

The following are acceptable as design procedures and references:

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

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

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

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

**4VAC50-20-322. Other applicable dam safety references.**

Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners, U.S. Department of Homeland Security, Federal Emergency Management Agency, October 1998, Reprinted January 2004; FEMA 64

Federal Guidelines for Dam Safety: Selecting and Accommodating Inflow Design Floods for Dams, U.S. Department of Homeland Security, Federal Emergency Management Agency, October 1998, Reprinted April 2004; FEMA 94

**FORMS**

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

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

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

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

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

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

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

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

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

§ 3.1-249.27. Definitions.

"Agricultural commodity" means any plant or part thereof, or animal, or animal product, produced by a person, including farmers, ranchers, vineyardists, plant propagators, Christmas tree growers, aquaculturists, floriculturists, orchardists, foresters, nurserymen, wood treaters not for hire, or other comparable persons, primarily for sale, consumption, propagation, or other use by man or animals.

§ 3.1-337. Definitions.

(1) "Agricultural product" means any horticultural, viticultural, dairy, livestock, poultry, bee or other farm or garden product;