

DISCUSSION DRAFT – NOT APPROVED

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

Part I: General

4VAC50-20-10. Authority.

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

Statutory Authority: §10.1-605 of the Code of Virginia.
Historical Notes: Derived from VR625-01-00 §1.1, eff. February 1, 1989.

4VAC50-20-20. General provisions.

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

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

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

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

E. Where subjectivity is permissible, determinations relative to this chapter shall be conducted utilizing competent, experienced, engineering judgment. xxxxx

~~E~~ F. The official forms as called for by this chapter are available from the director.
[CHECK]

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).

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

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

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

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

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

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

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

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

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

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

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

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

75 "Drill" means a type of emergency action plan exercise that tests, develops, or maintains
76 skills in an emergency response procedure. During a drill, participants perform an in-house
77 exercise to verify telephone numbers and other means of communication along with the dam
78 owner's response. A drill is considered a necessary part of ongoing training.

79 "Emergency Action Plan or EAP" means a formal document that identifies potential dam
80 emergency conditions and specifies preplanned actions to be followed to minimize loss of life
81 and property damage. The EAP specifies actions the dam owner must take to minimize or
82 alleviate safety issues at the dam. It contains procedures and information to assist the dam owner
83 in issuing early warning and notification messages to responsible emergency management
84 authorities. It shall also contain dam break inundation zone maps as required to show emergency
85 management authorities the critical areas for action in case of emergency.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

149
150 Statutory Authority: §10.1-605 of the Code of Virginia.
151 Historical Notes: Derived from VR625-01-00 §1.3, eff. February 1, 1989; Amended, Virginia Register Volume 18,
152 Issue 14, eff. July 1, 2002.
153 Effect of Amendment: The July 1, 2002 amendment revised the definitions for "director" and "impounding structure".

154
155 **4VAC50-20-40. Classes of impounding structures.**

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

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

163 1. ~~Impounding structures in the Class I hazard potential category are located where~~
164 ~~failure will cause probable loss of life or serious damage to occupied building(s), industrial or~~
165 ~~commercial facilities, important public utilities, main highway(s) or railroad(s).~~

166 2. ~~Impounding structures in the Class II hazard potential category are located where~~
167 ~~failure could cause possible loss of life or damage to occupied building(s), industrial or~~
168 ~~commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service~~
169 ~~of relatively important public utilities.~~

170 3. ~~Impounding structures in Class III hazard potential category are located where failure~~
171 ~~may cause minimal property damage to others. No loss of life is expected.~~

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

174 5 C. Such size and hazard potential classifications shall be proposed by the owner and
 175 shall be subject to approval by the director. Present and ~~projected development of planned land-~~
 176 use in the dam break inundation zones downstream from the impounding structure shall be
 177 considered in determining the classification.

178 6 D. Impounding structures shall be subject to reclassification by the Board as necessary.

179

180 Statutory Authority: §10.1-605 of the Code of Virginia.
 181 Historical Notes: Derived from VR625-01-00 §1.4, eff. February 1, 1989.

182

183 **4VAC50-20-50. Performance standards required for impounding structures.**

184 A. 1. In accordance with the definitions provided by Virginia Code § 10.1-604 and
 185 4VAC50-20-30, an impounding structure shall be regulated if the dam is 25 feet or greater in
 186 height and creates a maximum impounding capacity of 15 acre-feet or greater, or the dam is six
 187 feet or greater in height and creates a maximum impounding capacity of 50 acre-feet or greater
 188 and is not otherwise exempt from regulation by the Code of Virginia. Impounding structures
 189 exempted are those that are:

190 a. licensed by the State Corporation Commission that are subject to a safety inspection
 191 program;

192 b. owned or licensed by the United States government;

193 c. operated primarily for agricultural purposes which are less than 25 feet in height or
 194 which create a maximum impoundment capacity smaller than 100 acre-feet;

195 d. water or silt retaining dams approved pursuant to §45.1-222 or §45.1-225.1 of the
 196 Code of Virginia; or

197 e. obstructions in a canal used to raise or lower water.

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

205

206

TABLE 1--Impounding Structure Regulations

207

Hazard Class of Dam ²	Hazard Potential If Impounding Structure Fails	SIZE CLASSIFICATION		Spillway Design Flood (SDF) ^{b 4}
		Maximum Impounding Capacity (Ac-Ft) ^{a 3}	Height(Ft) ^{a 3}	
<u>HIGH</u>	<u>Probable Loss of Life; Excessive Economic Loss</u>	<u>All¹</u> <u>Large ≥ 50,000</u>	<u>All¹</u> <u>≥100</u>	<u>PMF⁵</u> <u>PMF^e</u> <u>PMF</u>

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		Medium $\geq 1,000$ & $< 50,000$	≥ 40 & < 100	1/2 PMF to PMF
		Small ≥ 50 & $< 1,000$	≥ 25 & < 40	
<u>SIGNIFICANT</u>	Possible Loss of Life;	Large $\geq 50,000$	≥ 100	PMF
	Appreciable	Medium $\geq 1,000$ & $< 50,000$	≥ 40 & < 100	1/2 .50 PMF to PMF
II	Economic Loss	Small ≥ 50 & $< 1,000$	≥ 25 & < 40	100-YR to 1/2 .50 PMF
<u>LOW</u>	No Loss of Life	Large $\geq 50,000$	≥ 100	1/2 PMF to PMF 100-YR ²
	Expected; Minimal	Medium $\geq 1,000$ & $< 50,000$	≥ 40 & < 100	100-YR ² to 1/2 PMF
III	Economic Loss	Small ≥ 50 & $< 1,000$	≥ 25 & < 40	50-YR ^{4g} to 100-YR ^e
IV	No Loss of Life	≥ 50	≥ 25 (both)	50-YR to 100-YR
	Expected; No	-(non agricultural)		
	Economic Loss to	≥ 100		
	Others	-(agricultural)		

208

209 2. Hazard classes of dams are as follows:

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

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

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

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

225 b 4. The spillway design flood (SDF) represents the largest flood that need be considered
 226 in the evaluation of the performance for a given project. The impounding structure shall perform
 227 so as to safely pass the appropriate SDF. Where a range of SDF is indicated, the magnitude that
 228 most closely relates to the involved risk should be selected. proportionalize the height and
 229 maximum impounding capacity within the appropriate size classification and apply the
 230 maximum proportion within the SDF range to determine the appropriate SDF. Reductions in the
 231 established SDF may be evaluated through the use of incremental damage assessment pursuant
 232 to 4 VAC 50-20-54. The SDF established for an impounding structure shall not be less than
 233 those standards established elsewhere in the Code of Virginia or its attendant regulations
 234 including but not limited to design criteria for stormwater management facilities. The
 235 establishment in this chapter of rigid design flood criteria or standards is not intended. Safety
 236 must be evaluated in the light of peculiarities and local conditions for each impounding structure
 237 and in recognition of the many factors involved, some of which may not be precisely known.

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238 Such can only be done by competent, experienced engineering judgment, which the values in
239 Table 1 are intended to supplement, not supplant.

240 e 5. PMF: Probable maximum flood. This means is the flood that might be expected from
241 the most severe combination of critical meteorologic and hydrologic conditions that are
242 reasonably possible in the region. The PMF is derived from the current probable maximum
243 precipitation (PMP) available from the National Weather Service, NOAA. In some cases local
244 topography or meteorological conditions will cause changes from the generalized PMP values;
245 therefore, it is advisable to contact local, state or federal agencies to obtain the prevailing
246 practice in specific cases. Any deviation in the application of established developmental
247 procedures must be explained and justified by the owner’s engineer. The owner’s engineer must
248 run the PMF for 6, 12 and 24 hour durations, using the inflow hydrograph that creates the largest
249 peak inflow for non-failure and failure analyses. It is expected that generally the 6-hour storm
250 duration applies to small, less than 10 square mile, drainage basins. Present and planned land-
251 use conditions shall be considered in determining the runoff characteristics of the drainage area.

252 d 6. 50-Yr: 50-year flood. This means represents the flood magnitude expected to be
253 equaled or exceeded on the average of once in 50 years. It may also be expressed as an
254 exceedence probability with a 2.0% chance of being equaled or exceeded in any given year. For
255 the purposes of determining compliance of an impounding structure with the Spillway Design
256 Flood (SDF), it shall be acceptable to substitute 0.15 PMF for the 50-year flood value. Present
257 and planned land-use conditions shall be considered in determining the runoff characteristics of
258 the drainage area.

259 e 7. 100-Yr: 100-year flood. This means represents the flood magnitude expected to be
260 equaled or exceeded on the average of once in 100 years. It may also be expressed as an
261 exceedence probability with a 1.0% chance of being equaled or exceeded in any given year. For
262 the purposes of determining compliance of an impounding structure with the Spillway Design
263 Flood (SDF), it shall be acceptable to substitute 0.20 PMF for the 100-year flood value. Present
264 and planned land-use conditions shall be considered in determining the runoff characteristics of
265 the drainage area.

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

268 1. If the road is public, state maintained, or used by several families others than those
269 specified in subsection B2, then the dam is to be classified at a minimum as a Significant Hazard
270 impounding structure; and

271 2. If the road is private, not maintained by the state and only used by the owner, owner’s
272 family and guests then the dam is to be classified at a minimum as a Low Hazard impounding
273 structure.

274
275 Statutory Authority: §10.1-605 of the Code of Virginia.
276 Historical Notes: Derived from VR625-01-00 §1.5, eff. February 1, 1989; Amended, Virginia Register Volume 18,
277 Issue 14, eff. July 1, 2002.
278 Effect of Amendment: The July 1, 2002 amendment corrected the "greater than" and "equal than" signs in Table 1.

279

280 **4VAC50-20-52. Dam break inundation zone mapping.**

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281 A. All dam owners must provide inundation maps representing the impacts that would
282 occur should their dam fail. High and Significant Hazard dams shall provide detailed dam break
283 inundation zone maps in accordance with the requirements setout in subsection B. Low Hazard
284 dams shall require a simple map demonstrating the general inundation that results from a dam
285 failure.

286 B. The requirements for a dam break inundation map for High and Significant Hazard
287 dams are as follows:

288 1. Maps shall be developed for both the sunny day failure condition and the Spillway
289 Design Flood failure condition to show the expected extremes in peak water surface elevations,
290 travel times of the front of the dam break flood wave to critical locations, and distances
291 downstream between the two scenarios. A sunny day failure must be modeled starting with the
292 reservoir at normal pool and assuming that the total failure will take between 0.5 and 3 hours
293 with a failure width of ½ to twice the height of the dam and side slopes of less than
294 Horizontal/Vertical and failure beginning when the reservoir is near the storm generated peak
295 reservoir elevation. Inundation mapping should extend downstream until the breach flood wave
296 would be non-damaging.

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

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

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

311
312 **4VAC50-20-54. Incremental damage assessment.**

313 Once the owner’s engineer has determined the required spillway design flood through
314 application of Table 1, further analysis may be performed to evaluate the incremental damage
315 assessment. This assessment may be used to lower the spillway design flood to the flood that
316 would not cause additional death or property damage due to a dam failure over that which would
317 occur without failure above which the incremental increase in water surface elevation
318 downstream due to failure of a dam is no longer considered to present an unacceptable additional
319 downstream threat. This analysis will require detailed computer modeling that produces water
320 surface elevations at each structure that may be impacted downstream of the dam. Water depths
321 greater than two feet and overbank flow velocities greater than three feet per second shall be
322 used to determine impacts to persons or property. Water depth changes less than two feet and

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323 overbank flow velocities less than three feet per second may be considered as ineffective to
324 structures downstream of the dam.

325

326 **4VAC50-20-56. Alternative procedures (decision matrix) assessment.**

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

331

332 **4VAC50-20-58. Local government notifications.**

333 For each certificate issued, the dam owner shall send to the appropriate local government
334 a copy of the certificate and a description and map showing the area that could be affected by the
335 breach. This notification would also serve to advise the locality that if development occurs in the
336 dam break inundation zone that this could adversely affect the classification of the dam and
337 require significant expenses to upgrade the dam.

338

339

Part II: Permit Requirements

340

341 **4VAC50-20-60. Required permits.**

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

344 B. No person or entity shall alter or begin to alter an existing impounding structure **in a**
345 **manner which would potentially affect its structural integrity** until the board has issued an
346 alteration permit, or in the case of an emergency, authorization **is** obtained from the director. The
347 permit requirement may be waived if the director determines that the alteration of improvement
348 will not substantially alter or affect the structural integrity of the impounding structure.

349 **Alteration does not mean normal operation and maintenance.**

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

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

355

356 Statutory Authority: §10.1-605 of the Code of Virginia.
357 Historical Notes: Derived from VR625-01-00 §2.1, eff. February 1, 1989.

358

359 **4VAC50-20-70. Construction permits.**

360 A. Prior to preparing the complete design report for a construction permit, applicants are
361 encouraged to seek approval of the project concept from the director. For this purpose the

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362 applicant should submit a general description of subdivisions 1 through 4 of subsection B of this
363 section and subdivisions 1 and 2 of this subsection:

364 1. Proposed design criteria and a description of the size, ground cover conditions, extent
365 of current development of the watershed, jurisdictional comprehensive planning for development
366 of the watershed, and the geologic and the geotechnical engineering assumptions used to
367 determine the foundations and materials to be used.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

418 17. An emergency action plan ~~on official forms~~ developed in accordance with 4VAC50-
419 20-175 and evidence that ~~a copy~~ the required copies of such plan ~~has~~ have been filed with the
420 Department, the local organization for emergency management and the State Department of
421 Emergency Management. The plan shall include a method of providing notification and warning
422 to persons downstream, other affected persons or property owners and local authorities in the
423 event of a flood hazard or the potential or impending failure of the impounding structure.

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

430 19. Place holder for stormwater construction permit requirement language.

431 20. Placeholder for cultural and historic resources?????????

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

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

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

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

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

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

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

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

463 K. The owner's licensed professional engineer shall advise the director when the
464 impounding structure may safely impound water. The director shall acknowledge this statement
465 within 10 days after which the impoundment may be filled under the engineer's supervision. The
466 director's acknowledgement shall act as a temporary operation and maintenance certificate until
467 an operation and maintenance certificate has been applied for and issued in accordance with
468 4VAC50-20-110.

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

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

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

478

479 **4VAC50-20-80. Alterations permits.**

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

483 B. Alterations which would potentially affect the structural integrity of an impounding
484 structure include, but are not limited to, changing its the height or otherwise enlarging the dam,
485 increasing the normal pool or principal spillway elevation or physical dimensions, changing the
486 elevation or physical dimensions of the emergency spillway, conducting necessary repairs or
487 structural maintenance, or removing the impounding structure.

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

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

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

494 F. Each alteration permit shall contain an expiration date that shall not extend past two
495 years from the date of issuance.

496

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

499

500 **4VAC50-20-90. Transfer of permits.**

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

506

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

509

510 **Part III: Certificate Requirements**

511

512 **4VAC50-20-100. Operation and maintenance certificates.**

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

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

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

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

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

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

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

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

539 I. The owner of any impounding structure shall meet the emergency action plan submittal
540 requirements setout in 4VAC50-20-175.

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

543 **4VAC50-20-110. Operation and maintenance certificate for newly constructed impounding**
544 **structures.**

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

547 1. A complete set of as-built drawings certified by a licensed professional engineer and
548 an as-built report on official forms.

549 2. A copy of a certificate from the licensed professional engineer who has inspected the
550 impounding structure during construction certifying that, to the best of his judgment, knowledge
551 and belief, the impounding structure and its appurtenances were constructed in conformance with
552 the plans, specifications, drawings and other requirements approved by the board.

553 3. A copy of the operation and maintenance plan ~~and emergency action plan~~ submitted
554 with the design report including any changes required by the director. The emergency action
555 plan shall also be updated as necessary and resubmitted at this time.

556 B. If the director finds that the operation and maintenance plan or emergency action plan
557 developed in accordance with 4VAC50-20-175 is deficient, he shall return it to the owner within
558 60 days with suggestions for revision.

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

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

564 **4VAC50-20-120. Operation and maintenance certificates for existing impounding**
565 **structures.**

566 A. **Any owner of an a High, Significant, or Low Hazard impounding structure other than**
567 **a Class IV impounding structure which has already filed an inventory report that does not have**
568 **an operation and maintenance certificate or any owner renewing an operation and maintenance**
569 **certificate shall file an application with the board.**

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

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

580 2. An inventory report for **Class III Low Hazard** impounding structures. The inventory
581 report shall include:

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

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

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

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

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

591 f. Recommendations for remedial work.

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

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

607 C. The owner shall certify in writing that the operation and maintenance plan approved
608 by the board will be adhered to during the life of the project except in cases of emergency
609 requiring departure therefrom in order to mitigate hazard to life and property, at which time the
610 owner's engineer, ~~and the director~~, and other specified contacts shall be notified in accordance
611 with the emergency action plan developed in accordance with 4VAC50-20-175.

612 D. If the director finds that the operation and maintenance plan or emergency action plan
613 developed in accordance with 4VAC50-20-175 is deficient, he shall return it to the owner within
614 60 days with suggestions for revision to meet the specified minimum requirements.

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

618
619

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

DISCUSSION DRAFT – NOT APPROVED

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 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 now require a conditional certificate until the new spillway design flood requirements are adequately addressed. If circumstances change during this delay effective period that justify more immediate repairs to the impounding structure, the Board may direct alterations sooner. 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. [THIS PLACEHOLDER SECTION IS UNDER CONSTRUCTION PURSUANT TO THE JULY 12 TAC DISCUSSIONS AND WOULD REPLACE DRAFT SECTION 130 BELOW.]

4VAC50-20-130. Existing impounding 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 C. 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 an operation and maintenance certificate for such those 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 VAC 50-20-175 have been satisfied;
- 2 4. Annual owner's inspection reports have been consistently filed with, and are considered satisfactory, by the director;

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665 3 5. The applicant proves in accordance with the current design procedures and
666 references of 4VAC50-20-320 to the satisfaction of the board that the impounding structure as
667 designed, constructed, operated and maintained does not pose an unreasonable hazard to life and
668 property; and

669 4 6. The owner satisfies all special requirements imposed by the board.

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

674

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

677

678 **~~4VAC50-20-140. Existing impounding structures constructed after July 1, 1982.~~**

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

683

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

686

687 **4VAC50-20-150. Conditional operation and maintenance certificate.**

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

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

697 C. A conditional certificate may be renewed in accordance with the procedures of
698 4VAC50-20-120 provided that annual owner inspection reports are on file, and the board
699 determines that the owner is proceeding with the necessary corrective actions.

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

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

704

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

707

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708 **4VAC50-20-160. Additional operation and maintenance requirements.**

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

712 **B. In accordance with § 10.1-609.2 of the Code of Virginia, dam owners shall not permit**
713 **the growth of trees and other woody vegetation and shall remove any such vegetation from the**
714 **slopes and crest of embankments and the emergency spillway area, and within a distance of 25**
715 **feet from the toe of the embankment and abutments of the dam.**

716

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

719

720 **4VAC50-20-170. Transfer of certificates.**

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

728

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

731

732 **4VAC50-20-175. Emergency Action Plans.**

733 A. In order to minimize the loss of life and property damage during potential emergency
734 conditions at a dam, and to ensure effective, timely action is taken should a dam emergency
735 occur, an EAP shall be required for each impounding structure. The emergency action plans
736 shall be coordinated with the Department of Emergency Management in accordance with §44-
737 146.18. The plans required by these regulations shall be incorporated into local and inter-
738 jurisdictional emergency plans pursuant to §44-146.19.

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

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

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

748 E. A drill shall be conducted annually for each High, Significant, or Low hazard
749 impounding structure. A table-top exercise shall be conducted once every 3 years for High, and
750 Significant hazard structures. Owners shall certify to the Department annually that an exercise

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751 has been completed and the statement shall include a critique of the exercise and any revisions or
752 updates to the plan or a statement that no revisions or updates are needed.

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

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

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

760 2. Emergency Detection, Evaluation, and Classification - The plan shall include a
761 discussion of the procedures for timely and reliable detection, evaluation, and classification of an
762 emergency situation to ensure that the appropriate course of action is taken based on the urgency
763 of the situation. Where appropriate, the situations should address dam breaks that are imminent
764 or in progress, a situation where the potential for dam failure is rapidly developing, and a
765 situation where the threat is slowly developing.

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

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

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

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

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

785
786 Table X: Emergency Action Plan Requirement Summary

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<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>	

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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 following format shall be used as necessary to address the requirements of this section.

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Part IV: Procedures

4VAC50-20-180. Inspections.

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

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

4VAC50-20-190. Right to hearing.

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

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

4VAC50-20-200. Enforcement.

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

DISCUSSION DRAFT – NOT APPROVED

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

864

865 **4VAC50-20-210. Consulting boards.**

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

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

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

875

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

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

878

879 **4VAC50-20-220. Unsafe conditions.**

880 A. No owner shall ~~have the right to~~ maintain an **unsafe** impounding structure ~~which~~
881 ~~unreasonably threatens the life or property of another person. The owner of any impounding~~
882 ~~structure found to have deficiencies which could threaten life or property if uncorrected shall~~
883 ~~take the corrective actions needed to remove such deficiencies within a reasonable period of~~
884 ~~time. Designation of an impounding structure as unsafe shall be made in accordance with §~~
885 ~~10.1-607.1 of the Code of Virginia.~~

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

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

898

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

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

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

904

905 **4VAC50-20-230. Complaints.**

DISCUSSION DRAFT – NOT APPROVED

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

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

913
914 Statutory Authority: §10.1-605 of the Code of Virginia.
915 Historical Notes: Derived from VR625-01-00 §4.6, eff. February 1, 1989.
916

917 **Part V: Design Requirements**

918 919 **4VAC50-20-240. Design of structures.**

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

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

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

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

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

938
939 Statutory Authority: §10.1-605 of the Code of Virginia.
940 Historical Notes: Derived from VR625-01-00 §5.1, eff. February 1, 1989.
941

942 **4VAC50-20-250. Design flood.**

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

DISCUSSION DRAFT – NOT APPROVED

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951

Statutory Authority: §10.1-605 of the Code of Virginia.
Historical Notes: Derived from VR625-01-00 §5.2, eff. February 1, 1989.

952

953 **4VAC50-20-260. Emergency spillway design.**

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

956 B. An emergency spillway shall be required.

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

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

967

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

970

971 **4VAC50-20-270. Principal spillways and outlet works.**

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

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

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

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

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

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

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

DISCUSSION DRAFT – NOT APPROVED

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

996 F. Any deficiencies in discharge performance likely to result from delays in the operation
997 of gates before attendants could be reasonably expected to reach the control for in estimating
998 "dependable" discharge capabilities to be assumed in routing the spillway design flood through
999 reservoir. Reports on design studies shall indicate the allowances made for possible delays in
1000 initiating gate operations. Normally, for projects located in small basins, where critical spillway
1001 design flood inflows may occur within several hours after intense precipitation, outflows through
1002 any regulating outlets that must be opened after the flood begins shall be assumed to be zero for
1003 an appropriate period of time subsequent to the beginning of intense rainfall.

1004 G. All gates, valves, conduits and concrete channel outlets shall be designed and
1005 constructed to prevent significant erosion or damage to the impounding structure or to the
1006 downstream outlet or channel.

1007
1008 Statutory Authority: §10.1-605 of the Code of Virginia.
1009 Historical Notes: Derived from VR625-01-00 §5.4, eff. February 1, 1989.

1010

1011 **4VAC50-20-280. Drain requirements.**

1012 All new impounding structures regardless of their hazard potential classification, shall
1013 include a device to permit draining of the impoundment within a reasonable period of time as
1014 determined by the owner's **licensed** professional engineer, subject to approval by the director.

1015
1016 Statutory Authority: §10.1-605 of the Code of Virginia.
1017 Historical Notes: Derived from VR625-01-00 §5.5, eff. February 1, 1989.

1018

1019 **4VAC50-20-290. Life of the impounding structure.**

1020 Components of the impounding structure, the impoundment, the outlet works, drain
1021 system and appurtenances shall be durable in keeping with the design and planned life of the
1022 impounding structure.

1023
1024 Statutory Authority: §10.1-605 of the Code of Virginia.
1025 Historical Notes: Derived from VR625-01-00 §5.6, eff. February 1, 1989.

1026

1027 **4VAC50-20-300. Additional design requirements.**

1028 A. Flood routings shall start at or above the elevation of the crest of the lowest ungated
1029 outlet.

1030 B. All elements of the impounding structure and impoundments shall conform to sound
1031 engineering practice. Safety factors, design standards and design references that are used shall be
1032 included with the design report.

DISCUSSION DRAFT – NOT APPROVED

1033 C. Inspection devices may be required by the director for use by inspectors, owners or the
1034 director in conducting inspections in the interest of structural integrity during and after
1035 completion of construction and during the life of the impounding structure.

1036
1037 Statutory Authority: §10.1-605 of the Code of Virginia.
1038 Historical Notes: Derived from VR625-01-00 §5.7, eff. February 1, 1989.

1039

1040 **4VAC50-20-310. Plans and specifications.**

1041 The plans and specifications for a proposed impounding structure shall consist of a
1042 detailed engineering design report that includes engineering drawings and specifications, with
1043 the following as a minimum:

1044 1. The name of the project; the name of the owner; classification of the impounding
1045 structure as set forth in this chapter; designated access to the project and the location with respect
1046 to highways, roads, streams and existing impounding structures and impoundments that would
1047 affect or be affected by the proposed impounding structure.

1048 2. Cross-sections, profiles, logs of test borings, laboratory and in situ test data, drawings
1049 of principal and emergency spillways and other additional drawings in sufficient detail to
1050 indicate clearly the extent and complexity of the work to be performed.

1051 3. The technical provisions, as may be required to describe the methods of the
1052 construction and construction quality control for the project.

1053 4. Special provisions, as may be required to describe technical provisions needed to
1054 ensure that the impounding structure is constructed according to the approved plans and
1055 specifications.

1056

1057 Statutory Authority: §10.1-605 of the Code of Virginia.
1058 Historical Notes: Derived from VR625-01-00 §5.8, eff. February 1, 1989.

1059

1060 **4VAC50-20-320. Acceptable design procedures and references.**

1061 The following are acceptable as design procedures and references:

1062 1. The design procedures, manuals and criteria used by the United States Army Corps of
1063 Engineers.

1064 2. The design procedures, manuals and criteria used by the United States Department of
1065 Agriculture, Natural Resources Conservation Service.

1066 3. The design procedures, manuals and criteria used by the United States Department of
1067 the Interior, Bureau of Reclamation.

1068 4. The design procedures, manuals and criteria used by the United States Department of
1069 Commerce, National Weather Service.

1070 5. Other design procedures, manuals and criteria that are accepted as current, sound
1071 engineering practices, as approved by the director prior to the design of the impounding
1072 structure.

1073 Statutory Authority: §10.1-605 of the Code of Virginia.
1074

DISCUSSION DRAFT – NOT APPROVED

1075 Historical Notes: Derived from VR625-01-00 §5.9, eff. February 1, 1989; Amended, Virginia Register Volume 18,
1076 Issue 14, eff. July 1, 2002.
1077 Effect of Amendment: The July 1, 2002 amendment, in paragraph 2, changed "Soil" to "Natural Resources" before
1078 "Conservation"; and, in paragraph 3, changed "or Interior" to "of the Interior".

1079

1080 **4VAC50-20-322. Other applicable dam safety references.**
1081 **EAP reference**
1082 **Incremental reference**

1083

FORMS

1084

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

1086

1087 Operation and Maintenance Application **Class I, II and III High and Significant Hazard**
1088 Impounding Structures, DCR 199-099 (rev. 12/01).

1089

1090 As-Built Report for **Class I, II and III High, Significant, and Low Hazard** Impounding
1091 Structures, DCR 199-100 (rev. 12/01).

1092

1093 Design Report for the Construction/Alteration of Impounding Structures, DCR 199-101
1094 (rev. 12/01).

1095

1096 ~~Emergency Action Plan for Class I, Class II and Class III Impounding Structures, DCR~~
1097 ~~199-103 (rev. 12/01).~~

1098

1099 Inventory Report for **Class III and Class IV Low Hazard** Impounding Structures, DCR
1100 199-104 (rev. 12/01).

1101

1102 Reinspection Report for **Class I and II High and Significant Hazard** Impounding
1103 Structures, DCR 199-105 (rev. 12/01).

1104

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

1106

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

1108

1109

1110

1111

1112 **Spillway Flow Reduction Parking Lot Items**

1113 Full scale exercise (every 2 years) and functional exercise (every 6 years) might be part of a
1114 reduction process.

1115 Inundation maps updated more frequently

1116 Functioning I-Flow System or other observation system

1117 Proactive – Inundation maps driving future zoning

DISCUSSION DRAFT – NOT APPROVED

1118 DCR in-depth review of the EAP require \$\$\$'s

1119 Automated warning/ notification system

1120

1121 Functional and full scale exercises shall be considered comprehensive exercises and shall only be

1122 required pursuant to section xxxx (spillway design reduction strategies).

1123

DISCUSSION DRAFT – NOT APPROVED

1124 § 3.1-249.27. Definitions.

1125 "Agricultural commodity" means any plant or part thereof, or animal, or animal product,
1126 produced by a person, including farmers, ranchers, vineyardists, plant propagators, Christmas
1127 tree growers, aquaculturists, floriculturists, orchardists, foresters, nurserymen, wood treaters not
1128 for hire, or other comparable persons, primarily for sale, consumption, propagation, or other use
1129 by man or animals.

1130

1131 § 3.1-337. Definitions.

1132 (1) "Agricultural product" means any horticultural, viticultural, dairy, livestock, poultry, bee or
1133 other farm or garden product;

1134