

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

~~E~~ 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).

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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 structural repairs or structural maintenance, or removing the impounding
53 structure. 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 recognizes identifies
80 potential dam emergency conditions and specifies preplanned actions to be followed to minimize
81 loss of life and property damage. The EAP specifies actions the dam owner must take to
82 minimize or alleviate emergency conditions-safety issues at the dam. It contains procedures and
83 information to assist the dam owner in issuing early warning and notification messages to
84 responsible emergency management authorities. It shall also contain dam break inundation zone
85 maps as required to show emergency management authorities the critical areas for action in case
86 of emergency.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

157
158 Statutory Authority: §10.1-605 of the Code of Virginia.
159 Historical Notes: Derived from VR625-01-00 §1.3, eff. February 1, 1989; Amended, Virginia Register Volume 18,
160 Issue 14, eff. July 1, 2002.
161 Effect of Amendment: The July 1, 2002 amendment revised the definitions for "director" and "impounding structure".

162
163 **4VAC50-20-40. Hazard Classifications Classes of impounding structures.**

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

168 B. For the purpose of this chapter, hazards pertain to potential loss of human life or
169 property damage to the property of others downstream from the impounding structure in event of
170 failure or faulty operation of the impounding structure or appurtenant facilities. Hazard classes
171 of dams are as follows.

172 1. High Hazard Potential is defined where an impounding structure (dam) Impounding
173 structures in the Class I hazard potential category are located where failure will cause probable

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174 loss of life or serious economic damage. Economic damage may include, but not be limited to,
175 occupied building(s), industrial or commercial facilities, ~~important~~ primary public utilities, ~~main~~
176 highway(s) or major public roadways, ~~railroad(s)~~ railroads, personal property, and agricultural
177 interests.

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

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

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

195 5 C. Such size and hazard potential classifications shall be proposed by the owner and
196 shall be subject to approval by the director. Present and projected development of planned land-
197 use in the dam break inundation zones downstream from the impounding structure shall be
198 considered in determining the classification.

199 6 D. Impounding structures shall be subject to reclassification by the Board as necessary.

200

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

203

204 **4VAC50-20-50. Performance standards required for impounding structures.**

205 A. In accordance with the definitions provided by Virginia Code § 10.1-604 and
206 4VAC50-20-30, an impounding structure shall be regulated if the dam is 25 feet or greater in
207 height and creates a maximum impounding capacity of 15 acre-feet or greater, or the dam is six
208 feet or greater in height and creates a maximum impounding capacity of 50 acre-feet or greater
209 and is not otherwise exempt from regulation by the Code of Virginia. Impounding structures
210 exempted are those that are:

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

213 2. owned or licensed by the United States government;

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

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

218 5. obstructions in a canal used to raise or lower water.

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

227
 228 **TABLE 1--Impounding Structure Regulations**
 229

Hazard Class of Dam ²	Hazard Potential If Impounding Structure Fails	SIZE CLASSIFICATION CATEGORIES ^A		Spillway Design Flood (SDF) ^{b 4C}
		Maximum Impounding Capacity (Ac-Ft) ^{a 3}	Height(Ft) ^{a 3}	
<u>HIGH</u> I	<u>Probable Loss of Life; Excessive Economic Loss</u>	<u>All^B</u> Large ≥ 50,000 Medium ≥ 1,000 & < 50,000 Small ≥ 50 & < 1,000	<u>All^B</u> ≥ 100 ≥ 40 & < 100 ≥ 25 & < 40	PMF ^{5D} PMF ^e PMF 1/2 PMF to PMF
<u>SIGNIFICANT</u> II	<u>Possible Loss of Life; Appreciable Economic Loss</u>	Large ≥ 50,000 Medium ≥ 1,000 & < 50,000 Small ≥ 50 <u>15</u> & < 1,000	≥ 100 ≥ 40 & < 100 ≥ 25 <u>6</u> & < 40	PMF 1/2 <u>.50</u> PMF to PMF 100-YR to 1/2 <u>.50</u> PMF
<u>LOW</u> III	<u>No Loss of Life Expected; Minimal Economic Loss</u>	Large ≥ 50,000 Medium ≥ 1,000 & < 50,000 Small ≥ 50 <u>15</u> & < 1,000	≥ 100 ≥ 40 & < 100 ≥ 25 <u>6</u> & < 40	1/2 PMF to PMF <u>100-YR</u> ^{2E} 100-YR ^{2F} to 1/2 PMF 50-YR ^{4GE} to 100-YR ^e
IV	No Loss of Life Expected; No Economic Loss to Others	≥ 50 -(non-agricultural) ≥ 100 -(agricultural)	≥ 25 (both)	50-YR to 100-YR

230
 231 2. Hazard classes of dams are as follows:
 232 High Hazard Potential is defined where an impounding structure (dam) failure will
 233 probably cause the loss of life or serious economic damage to occupied building(s), industrial or
 234 commercial facilities, primary public utilities, major public roadways, railroads or personal
 235 property;
 236 Significant Hazard Potential is defined where an impounding structure (dam) failure may
 237 cause the loss of life or appreciable economic damage to occupied building(s), industrial or

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238 commercial facilities, secondary public utilities, secondary public roadways, railroads or
239 personal property.

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

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

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

262 c 5D. PMF: Probable Maximum Flood maximum flood. This means is the flood that
263 might be expected from the most severe combination of critical meteorologic and hydrologic
264 conditions that are reasonably possible in the region. The PMF is derived from the current
265 probable maximum precipitation (PMP) available from the National Weather Service, NOAA.
266 In some cases local topography or meteorological conditions will cause changes from the
267 generalized PMP values; therefore, it is advisable to contact local, state or federal agencies to
268 obtain the prevailing practice in specific cases. Any deviation in the application of established
269 developmental procedures must be explained and justified by the owner's engineer. The owner's
270 engineer must develop PMF hydrographs for 6, 12, 24 hour durations. The hydrograph that
271 creates the largest peak outflow is to be used to determine capacity for non-failure and failure
272 analysis. Spillway integrity analysis will be based on the outflow hydrograph that most severely
273 tests the spillway's resistance to erosion. The owner's engineer must run the PMF for 6, 12 and
274 24 hour durations, using the inflow hydrograph that creates the largest peak inflow for non-
275 failure and failure analyses. Present and planned land-use conditions shall be considered in
276 determining the runoff characteristics of the drainage area.

277 d 6E. 50-Yr: 50-year flood. This means represents the flood magnitude expected to be
278 equaled or exceeded on the average of once in 50 years. It may also be expressed as an
279 exceedence probability with a 2.0% chance of being equaled or exceeded in any given year.

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280 Present and planned land-use conditions shall be considered in determining the runoff
281 characteristics of the drainage area.

282 e 7F. 100-Yr: 100-year flood. This means represents the flood magnitude expected to be
283 equaled or exceeded on the average of once in 100 years. It may also be expressed as an
284 exceedence probability with a 1.0% chance of being equaled or exceeded in any given year.

285 Present and planned land-use conditions shall be considered in determining the runoff
286 characteristics of the drainage area.

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

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

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

294
295 Statutory Authority: §10.1-605 of the Code of Virginia.

296 Historical Notes: Derived from VR625-01-00 §1.5, eff. February 1, 1989; Amended, Virginia Register Volume 18,
297 Issue 14, eff. July 1, 2002.

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

299

300 **4VAC50-20-52. Dam break inundation zone mapping**

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

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

309 1. Maps shall be developed for both the sunny day failure condition and the Spillway
310 Design Flood failure condition to show the expected extremes in peak water surface elevations,
311 travel times of the front of the dam break flood wave to critical locations, and distances
312 downstream between the two scenarios. Modeling of a sunny day failure shall consider that
313 there would be no gate operations or procedures to assist in reducing the impacts of the failure in
314 progress. Failure must consider that the full break will include removal of the entire height of
315 the embankment (width of breach may not include the entire embankment) in a time frame that
316 represents the assumed integrity of the structure. If the dam is comprised of concrete, stone,
317 masonry or other non-soil material then the failure would be a sudden failure of a slab or distinct
318 defined portion of the structure. The extent of this failure may not include the entire height of
319 the dam; however, the engineer must describe the reasoning of the final breach size to the
320 satisfaction of the director. A sunny day failure must be modeled with the reservoir at normal
321 pool and assuming that the total failure will take between 0.5 and 3 hours with a failure width of
322 0.5 to 2 times the height of the dam, and side slopes of less than 1 horizontal unit to 1 vertical
323 unit and failure beginning when the reservoir is near the storm generated peak reservoir

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324 ~~elevation.~~ In the case of a “Sunny-Day” dam failure the inundation mapping should extend
325 downstream of the dam to the location where the flood flows and flood wave are contained in the
326 defined natural stream channel or blends into perennial wetted bottom lands with no associated
327 property damage.

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

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

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

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

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

352

353 **4VAC50-20-54. Incremental damage assessment.**

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

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

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

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

361 3. Emergency Action Plan requirements setout in 4 VAC50-20-175 or 4VAC50-20-177
362 have been satisfied;

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

364 5. The applicant demonstrates in accordance with the current design procedures and
365 references of 4VAC50-20-320 to the satisfaction of the Board that the impounding structure as

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366 designed, constructed, operated and maintained does not pose an unreasonable hazard to life and
367 property:

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

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

370 C. After meeting the criteria setout in 4VAC50-20-54B to the Director’s satisfaction, the
371 owner’s engineer may proceed with evaluating the incremental damage analysis. Once the
372 owner’s engineer has determined the required spillway design flood through application of Table
373 1, further analysis may be performed to evaluate the incremental damage assessment. This
374 assessment may be used to lower the spillway design flood. Allowable reductions are set out in
375 subsection D, however, in no situation shall be the reduction be less than the level at flood that
376 would not cause additional death or property damage due to a dam failure over that which would
377 occur without failure above which the incremental increase in water surface elevation
378 downstream due to failure of a dam is no longer considered to present an unacceptable additional
379 downstream threat. This analysis will require detailed computer modeling that produces water
380 surface elevations at each structure that may be impacted downstream of the dam. Water depths
381 greater than two feet and overbank flow velocities greater than three feet per second shall be
382 used to determine impacts to persons or property. Water depth changes less than two feet and
383 overbank flow velocities less than three feet per second may be considered as ineffective to
384 structures downstream of the dam.

385 D. Allowable reductions are as follows:

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

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

390 (Idea of 2 year conditional for previously unregulated dams to “qualify” for incremental damage
391 assessment)

392

393 **4VAC50-20-56. Alternative procedures (decision matrix) assessment.**

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

398

399 **4VAC50-20-58. Local government notifications.**

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

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Part II: Permit Requirements

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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:

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- 448 1. A description of the impounding structure and appurtenances and a proposed
449 classification conforming with this chapter. The description shall include a statement of the
450 purposes for which the impoundment and impounding structure are to be used.
- 451 2. A description of properties located in the dam break inundation zone downstream from
452 the site of the proposed impounding structure, including the location and number of residential
453 structures, buildings, roads, utilities and other property that would be endangered should the
454 impounding structure fail.
- 455 3. A statement from the governing body of the local political subdivision or other
456 evidence confirming that the body is aware of the proposal to build an impounding structure and
457 that ~~of~~ the land use classifications are compatible with applicable to the dam break inundation
458 zone.
- 459 4. Maps showing the location of the proposed impounding structure that include: the
460 county or city in which the proposed impounding structure would be located, the location of
461 roads, access to the site and the outline of the impoundment. Existing aerial photographs or
462 existing topographic maps may be used for this purpose.
- 463 5. A report of the geotechnical investigations of the foundation soils or bedrock and of
464 the materials to be used to construct the impounding structure.
- 465 6. Design assumptions and analyses sufficient to indicate that the impounding structure
466 will be stable during its construction and during the life of the impounding structure under all
467 conditions of reservoir operations, including rapid filling, flood surcharge, seismic loadings and
468 rapid drawdown of the impoundment.
- 469 7. Evaluation of the stability of the reservoir rim area in order to safeguard against
470 reservoir rim slides of such magnitude as to create waves capable of overtopping the impounding
471 structure and confirmation of rim stability during seismic activity.
- 472 8. Design assumptions and analyses sufficient to indicate that seepage in, around, through
473 or under the impounding structure, foundation and abutments will be reasonably and practically
474 controlled so that internal or external forces or results thereof will not endanger the stability of
475 the impounding structure.
- 476 9. Calculations and assumptions relative to design of the spillway or spillways. Spillway
477 capacity shall conform to the criteria of Table 1.
- 478 10. Provisions to ensure that the impounding structure and appurtenances will be
479 protected against deterioration or erosion due to freezing and thawing, wind and rain or any
480 combination thereof.
- 481 11. Other pertinent design data, assumptions and analyses commensurate with the nature
482 of the particular impounding structure and specific site conditions, including when required by
483 ~~the director of this chapter,~~ a plan and profile of the dam break inundation zones.
- 484 ~~12. Erosion and sediment control plans to minimize soil erosion and sedimentation during~~
485 ~~all phases of construction, operation and maintenance. Projects shall be in compliance with local~~
486 ~~erosion and sediment control ordinances.~~
- 487 ~~13~~12. A description of the techniques to be used to divert stream flow during construction
488 so as to prevent hazard to life, health and property. Such diversion plans shall also be in
489 accordance with applicable environmental laws.

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490 1413. A plan of quality control testing to confirm that construction materials and methods
491 meet the design requirements set forth in the specifications.

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

493 ~~1614. Plans and specifications as required by 4VAC50-20-310.~~

494 ~~17. An emergency action plan on official forms developed in accordance with 4VAC50-~~
495 ~~20-175 and evidence that a copy the required copies of such plan has have been filed with the~~
496 ~~Department, the local organization for emergency management and the State Department of~~
497 ~~Emergency Management. The plan shall include a method of providing notification and warning~~
498 ~~to persons downstream, other affected persons or property owners and local authorities in the~~
499 ~~event of a flood hazard or the potential or impending failure of the impounding structure.~~

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

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

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

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

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

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

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

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

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

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

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

527 2. A drawing showing temporary diversion devices:

528 3. Potential impoundment during the construction:

529 4. Provisions for notification of potentially affected residences and structures;

530 5. Construction site evacuation routes, and

531 6. Any other special notes particular to the project.

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

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

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

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

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

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

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

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

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

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

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

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

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575 KJ. The owner's licensed professional engineer shall advise the director when the
576 impounding structure construction is complete and may safely impound water. If an Operation
577 and Maintenance Application and an Emergency Action Plan meeting the requirements of
578 4VAC50-20-175 or 4VAC 50-20-177 have been received and approved, the ~~The~~ director shall
579 issue a letter acknowledge this statement within 10 days, of receipt of the completion notification
580 authorizing that after which the impoundment may be filled under the engineer's direction
581 supervision. If the submission of an Operation and Maintenance Application or the Emergency
582 Action Plan is not acceptable, the director shall inform the applicant within 10 days and shall
583 explain what changes are required for an acceptable submission. The director's letter
584 acknowledgement authorizing that the impoundment may be filled shall also act as a temporary
585 operation and maintenance certificate, for a maximum of 150 days, until an a Regular Operation
586 operation and Maintenance Certificate maintenance certificate has been applied for and issued in
587 accordance with 4VAC50-20-110.

588
589 Statutory Authority: §10.1-605 of the Code of Virginia.

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

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

597

598 **4VAC50-20-80. Alterations permits.**

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

602 A. B. Alterations which would potentially affect the structural integrity of an impounding
603 structure include, but are not limited to, changing its the height or otherwise enlarging the dam,
604 increasing the normal pool or principal spillway elevation or physical dimensions, changing the
605 elevation or physical dimensions of the emergency spillway, conducting necessary repairs or
606 structural maintenance, or removing the impounding structure.

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

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

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

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

618 3. Local government acknowledgement of alteration and repair plan.

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

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

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

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

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

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

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

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

638 D. The alteration schedule shall include:

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

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

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

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

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

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

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

657 3. Any necessary interim provisions to the current Emergency Action Plan. Revisions
658 shall be submitted to the local organization for emergency management, the Virginia Department
659 of Emergency Management, and the Department.

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

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

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

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

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

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

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

689

690

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

692 Historical Notes: Derived from VR625-01-00 §2.3, eff. February 1, 1989.

693

694 **4VAC50-20-90. Transfer of permits.**

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

700

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

702 Historical Notes: Derived from VR625-01-00 §2.4, eff. February 1, 1989.

703

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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:

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

749 2. Certification ~~A copy of a certificate~~ from the licensed professional engineer who has
750 inspected the impounding structure during construction ~~certifying~~ that, to the best of ~~his~~ the
751 engineer's judgment, knowledge and belief, the impounding structure and its appurtenances were
752 constructed in conformance with the plans, specifications, drawings and other requirements
753 approved by the board.

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

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

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

762
763 Statutory Authority: §10.1-605 of the Code of Virginia.
764 Historical Notes: Derived from VR625-01-00 §3.2, eff. February 1, 1989.
765

766 **4VAC50-20-120. Operation and Maintenance Certificates ~~maintenance certificates~~ for**
767 **existing impounding structures.**

768 A. Any owner of an a High, Significant, or Low Hazard impounding structure ~~other than~~
769 ~~a Class IV impounding structure~~ which has already filed an Inspection Report ~~inventory report~~
770 that does not have a Regular Operation ~~an operation~~ and Maintenance Certificate ~~maintenance~~
771 ~~certificate~~ or any owner renewing a Regular Operation ~~an operation~~ and Maintenance Certificate
772 ~~maintenance certificate~~ shall file an application with the board.

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

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

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

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

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

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

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

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

790 f. Recommendations for remedial work.

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

801 43. An Emergency Action Plan ~~emergency action plan~~ developed in accordance with
802 4VAC50-20-175 or 4VAC50-20-177 and evidence that ~~a copy~~ the required copies of such plan
803 ~~has have~~ been filed with the Department, the local organization for emergency management and
804 the State Department of Emergency Management. The plan shall include a method of providing
805 notification and warning to persons downstream, other affected persons or property owners and
806 local authorities in the event of a flood hazard or the potential or impending failure of the
807 impounding structure.

808 C. The owner shall certify in writing in that the Operation ~~operation~~ and Maintenance
809 Application ~~maintenance plan approved by the board that operation and maintenance of the~~
810 impounding structure will be adhered to during the life of the project except in cases of
811 emergency requiring departure there from in order to mitigate hazard to life and property. ~~at~~
812 ~~which time the owner's engineer, and the director, and other specified contacts shall be notified~~
813 ~~in accordance with the emergency action plan developed in accordance with 4VAC50-20-175.~~

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

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

824
825 Statutory Authority: §10.1-605 of the Code of Virginia.
826 Historical Notes:Derived from VR625-01-00 §3.3, eff. February 1, 1989; Amended, Virginia Register Volume 18,
827 Issue 14, eff. July 1, 2002.
828 Effect of Amendment: The July 1, 2002 amendment, in paragraph B 1, substituted "previous safety inspection as
829 required by the board" for "Phase I or Phase II inspection as established by the U.S. Army Corps of Engineers"; in the
830 third sentence of paragraph B 3, substituted "safety inspection report required by the board" for "Phase I Inspection
831 Report"; and, in paragraph B 4, substituted "local organization for emergency management and the State Department of
832 Emergency Management" for "local and State Department of Emergency Services".
833

834 **4VAC50-20-125. Delayed effective date for Spillway Design Flood requirements for certain**
835 **impounding structures.**

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

- 846 1. Completion of the engineering studies necessary to determine upgrade requirements.
- 847 2. Completion of the design efforts.
- 848 3. Completion of the alteration permit application.
- 849 4. Completion of the alteration work.

850 During this delay period, dam owners are required to be working on plans to both upgrade their
851 dam to the required spillway design flood requirements and also to address other deficiencies
852 that may exist that are not related to the SDF. A complete alteration permit application shall be
853 submitted to the Department no later than January 1, 2012.

854
855 **4VAC50-20-130. Existing impounding Extension of Existing Operation and Maintenance**
856 **Certificates Grandfathering of certain impounding structures constructed prior to July 1,**
857 **1982.**

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

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

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

- 871 1. Operation and maintenance is determined by the director to be satisfactory and up to
872 date;
- 873 2. The dam is not in need of other alteration related to the integrity of the structure;
- 874 3. Emergency Action Plan requirements set out in 4 VAC50-20-175 have been satisfied;
- 875 2 4. Annual owner's inspection reports have been consistently filed with, and are
876 considered satisfactory, by the director;
- 877 3 5. The applicant proves in accordance with the current design procedures and
878 references of 4VAC50-20-320 to the satisfaction of the board that the impounding structure as

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879 designed, constructed, operated and maintained does not pose an unreasonable hazard to life and
880 property; and

881 4 ~~6~~. The owner satisfies all special requirements imposed by the board.

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

886

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

889

890 ~~**4VAC50-20-140. Existing impounding structures constructed after July 1, 1982.**~~

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

895

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

898

899 **4VAC50-20-150. Conditional operation and maintenance certificate.**

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

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

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

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

915 E. The owner of any impounding structure, whether under conditional certificate or
916 otherwise, shall meet the emergency action plan requirements setout in 4VAC50-20-175 or
917 4VAC50-20-177.

918

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

921

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922 **4VAC50-20-160. Additional operation and maintenance requirements.**

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

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

930

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

933

934 **4VAC50-20-170. Transfer of certificates.**

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

942

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

945

946 **4VAC50-20-175. Emergency Action Plan for High and Significant Hazard Dams.**

947 A. In order to minimize the loss of life and property damage during potential emergency
948 conditions at a dam, and to ensure effective, timely action is taken should a dam emergency
949 occur, an EAP shall be required for each impounding structure. The EAP ~~emergency action~~
950 plans shall be coordinated with the Department of Emergency Management in accordance with
951 §44-146.18. The EAP ~~plans~~ required by these regulations shall be incorporated into local and
952 inter-jurisdictional emergency plans pursuant to §44-146.19.

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

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

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

962 E. A drill shall be conducted annually for each **High or Significant** hazard impounding
963 structure. A table-top exercise shall be conducted once every 3 years. Owners shall certify to
964 the Department annually that an exercise has been completed and the statement shall include a

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965 critique of the exercise and any revisions or updates to the EAP plan or a statement that no
966 revisions or updates are needed.

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

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

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

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

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

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

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

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

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

1000
1001 Table 2: Emergency Action Plan Requirement Summary [IS THE TABLE NEEDED NOW??]

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

Title Page/Cover Sheet

Table of Contents

I. Certifications

II. Notification Flowchart

III. Statement of Purpose

IV. Project Description

V. Emergency Detection, Evaluation, and Classification

VI. General Responsibilities Under the EAP

A. Dam Owner Responsibilities

B. Responsibility for Notification

C. Responsibility for Evacuation

D. Responsibility for Termination and Follow-Up

E. EAP Coordinator Responsibility

VII. Preparedness

VIII. Inundation Maps

IX Appendices

A. Investigation and Analyses of Dambreak Floods

B. Plans for Training, Exercising, Updating, and Posting the EAP

C. Site-Specific Concerns

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1034 **4VAC50-20-177. Emergency Preparedness for Low Hazard Dams.**
1035 A. Low Hazard Dams shall provide information for emergency preparedness to the
1036 Department, the local organization for emergency management and the Virginia Department of
1037 Emergency Management. The information shall include, but not be limited, to the following:
1038 1. Current contact name and contact information, including phone number;
1039 2. Physical location of the dam;
1040 3. A procedure for notifying any downstream properties potentially impacted by the
1041 dam’s failure; and
1042 4. Certification by the owner and the local organization for emergency management.
1043
1044

Part IV: Procedures

1045
1046
1047 **4VAC50-20-180. Inspections.**
1048 A. The director may make inspections during construction, alteration or operation and
1049 maintenance as deemed necessary to ensure that the impounding structure is being constructed,
1050 altered or operated and maintained in compliance with the permit or certificate issued by the
1051 board. During the maintenance, construction, or alteration of any dam or reservoir, the director
1052 shall require the owner to perform, at the owner’s expense, such work or tests as necessary to
1053 obtain information sufficient to enable the director to determine whether conformity with the
1054 plans and specifications approved by the certificate is being secured. The director shall provide
1055 the owner a copy of the findings of these inspections. This inspection does not relieve the owner
1056 from the responsibility of providing adequate inspection during construction or operation and
1057 maintenance.
1058 B. Periodic inspections during construction or alteration shall be conducted under the
1059 direction supervision of a licensed professional engineer who shall inspect in accordance with
1060 the construction or alteration permit issued by the Board propose the frequency and nature of the
1061 inspections subject to approval by the director.
1062 C. Required Periodic inspections during operation and maintenance shall be conducted
1063 under the supervision of a licensed professional engineer at an interval not greater than that
1064 required to update the operation and maintenance certificate. At a minimum, an annual owner's
1065 inspection shall be conducted when a professional inspection is not required.
1066 D. Every owner shall provide for an inspection by a licensed professional engineer after
1067 overtopping of the impounding structure or flows cause significant damage to the emergency
1068 spillway. A copy of the findings of each inspection with the engineer's recommendations shall
1069 be filed with the board within a reasonable period of time not to exceed 30 days subsequent to
1070 completion of the inspection.

1071
1072 Statutory Authority: §10.1-605 of the Code of Virginia.
1073 Historical Notes: Derived from VR625-01-00 §4.1, eff. February 1, 1989.
1074

1075 **4VAC50-20-190. Right to hearing.**

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1076 Any owner aggrieved by an action taken by the director or by the board without hearing,
1077 or by inaction of the director or the board, under the provisions of this chapter, may demand in
1078 writing a formal hearing.

1079

1080 Statutory Authority: §10.1-605 of the Code of Virginia.
1081 Historical Notes: Derived from VR625-01-00 §4.2, eff. February 1, 1989.

1082

1083 **4VAC50-20-200. Enforcement.**

1084 ~~Any owner refusing to obey any order of the board or the director pursuant to this chapter~~
1085 ~~may be compelled to obey and comply with such provisions by injunction or other appropriate~~
1086 ~~remedy obtained in a court proceeding. Such proceeding shall be instituted by the board or in the~~
1087 ~~case of an emergency, by the director in the court which granted approval to the owner to~~
1088 ~~impound waters or, if such approval has not been granted, the proceeding shall be instituted in~~
1089 ~~any appropriate court. Enforcement of the provisions of this chapter shall be in accordance with~~
1090 the provisions of the Dam Safety Act (§ 10.1-604 et seq. of the Code of Virginia).

1091

1092 Statutory Authority: §10.1-605 of the Code of Virginia.
1093 Historical Notes: Derived from VR625-01-00 §4.3, eff. February 1, 1989.

1094

1095 **4VAC50-20-210. Consulting boards.**

1096 A. When the board needs to satisfy questions of safety regarding plans and specifications,
1097 construction or operation and maintenance, or when requested by the owner, the board may
1098 appoint a consulting **committee board** to report to it with respect to those questions of the
1099 impounding structure's safety of an impounding structure. Such a **committee board** shall consist
1100 of two or more consultants, none of whom have been associated with the impounding structure.

1101 B. The costs and expenses incurred by the consulting **committee board**, if appointed at the
1102 request of an owner, shall be paid by the owner.

1103 C. The costs and expenses incurred by the consulting **committee board**, if initiated by the
1104 board, shall be paid by the board.

1105

1106 Statutory Authority: §10.1-605 of the Code of Virginia.
1107 Historical Notes: Derived from VR625-01-00 §4.4, eff. February 1, 1989.

1108

1109 **4VAC50-20-220. Unsafe conditions.**

1110 A. No owner shall ~~have the right to maintain an unsafe impounding structure which~~
1111 ~~unreasonably threatens the life or property of another person. The owner of any impounding~~
1112 ~~structure found to have deficiencies which could threaten life or property if uncorrected shall~~
1113 ~~take the corrective actions needed to remove such deficiencies within a reasonable period of~~
1114 ~~time. Designation of an impounding structure as unsafe shall be made in accordance with §~~
1115 10.1-607.1 of the Code of Virginia.

1116 B. Imminent danger. When the director finds that an impounding structure is unsafe and
1117 constitutes an imminent danger to life or property, he shall immediately notify the State

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1118 Department of Emergency Management and confer with the owner and ensure that the
1119 Emergency Action Plan has been implemented if appropriate to do so. The owner of an
1120 impounding structure found to constitute an imminent danger to life or property shall take
1121 immediate corrective action to remove the imminent danger as required by §10.1-608 of the
1122 Code of Virginia.

1123 C. Nonimminent danger. The owner of an impounding structure who has been issued a
1124 ~~report by the board containing findings and recommendations,~~ **by the board,** for the correction of
1125 deficiencies which threaten life or property if not corrected, shall undertake to implement the
1126 recommendations for correction of deficiencies according to a schedule of implementation
1127 contained in that report as required by §10.1-609 of the Code of Virginia.

1128

1129 Statutory Authority: §10.1-605 of the Code of Virginia.

1130 Historical Notes: Derived from VR625-01-00 §4.5, eff. February 1, 1989; Amended, Virginia Register Volume 18,
1131 Issue 14, eff. July 1, 2002.

1132 Effect of Amendment: The July 1, 2002 amendment, in subsection B, changed "Emergency Services" to "Emergency
1133 Management"; and, in subsection C, changed "director" to "board", following "issued a report by the".

1134

1135 **4VAC50-20-230. Complaints.**

1136 A. Upon receipt of a complaint alleging that the person or property of the complainant is
1137 endangered by the construction, maintenance or operation of impounding structure, the director
1138 shall cause an inspection of the structure, unless the data, records and inspection reports on file
1139 with the board are found adequate to determine if the complaint is valid.

1140 B. If the director finds that an unsafe condition exists, the director shall proceed under the
1141 provisions of §§10.1-608 and 10.1-609 of the Code of Virginia to render the extant condition
1142 safe.

1143

1144 Statutory Authority: §10.1-605 of the Code of Virginia.

1145 Historical Notes: Derived from VR625-01-00 §4.6, eff. February 1, 1989.

1146

1147

Part V: Design Requirements

1148

1149 **4VAC50-20-240. Design of structures.**

1150 A. The owner shall complete all necessary investigations prior to submitting the design
1151 report. The scope and degree of precision required is a matter of engineering judgment based on
1152 the complexities of the site and the hazard potential classification of the proposed structure.

1153 B. Surveys shall be made with sufficient accuracy to locate the proposed construction site
1154 and to define the total volume of storage in the impoundment. Locations of center lines and
1155 other horizontal and vertical controls shall be shown on a map of the site. The area downstream
1156 and upstream from the proposed impounding structure shall be investigated in order to delineate
1157 the areas and extent of potential damage in case of failure or backwater due to flooding.

1158 C. The drainage area shall be determined. ~~Present, projected and potential future~~ and
1159 planned land-use conditions shall be considered in determining the runoff characteristics of the
1160 drainage area. The most severe of these conditions shall be included in the design calculations
1161 which shall be submitted as part of the design report.

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1162 D. The geotechnical engineering investigation shall consist of borings, test pits and other
1163 subsurface explorations necessary to adequately define the existing conditions. The
1164 investigations shall be performed so as to define the soil, rock and ground water conditions.

1165 E. All construction materials shall be adequately selected so as to ensure that their
1166 properties meet design criteria. If on-site materials are to be utilized, they shall be located and
1167 determined to be adequate in quantity and quality.

1168
1169 Statutory Authority: §10.1-605 of the Code of Virginia.
1170 Historical Notes: Derived from VR625-01-00 §5.1, eff. February 1, 1989.

1171
1172 **4VAC50-20-250. Design flood.**

1173 ~~The minimum design flood to be utilized in impounding structure evaluation, design,~~
1174 ~~construction, operation and maintenance shall be commensurate with the size and hazard~~
1175 ~~potential of the particular impounding structure as determined in 4VAC50-20-50 and Table 1.~~
1176 ~~Competent, experienced, professional engineering judgment by a licensed professional engineer~~
1177 ~~shall be used in applying those design and evaluation procedures referenced in 4VAC50-20-320~~
1178 ~~of this chapter.~~

1179
1180 Statutory Authority: §10.1-605 of the Code of Virginia.
1181 Historical Notes: Derived from VR625-01-00 §5.2, eff. February 1, 1989.

1182
1183 **4VAC50-20-260. Emergency spillway design.**

1184 A. Every impounding structure shall have a spillway system with adequate capacity to
1185 discharge the design flood without endangering the safety of the impounding structure.

1186 ~~B. An emergency spillway shall be required.~~

1187 C. Vegetated earth or an unlined emergency spillway may be approved when the
1188 applicant demonstrates that it will pass the spillway design flood without jeopardizing the safety
1189 of the impounding structure. In no case, however, shall dam owners permit the growth of trees
1190 and other woody vegetation in the emergency spillway area.

1191 D. Lined emergency spillways shall include design criteria calculations, plans and
1192 specifications for open channel, drop, ogee and chute spillways that include crest structures,
1193 walls, panel lining and miscellaneous details. All joints shall be reasonably water-tight and
1194 placed on a foundation capable of sustaining applied loads without undue deformation. Provision
1195 shall be made for handling leakage from the channel or under seepage from the foundation which
1196 might adversely affect the structural integrity and structural stability of the impounding structure.

1197
1198 Statutory Authority: §10.1-605 of the Code of Virginia.
1199 Historical Notes: Derived from VR625-01-00 §5.3, eff. February 1, 1989.

1200
1201 **4VAC50-20-270. Principal spillways and outlet works.**

1202 A. It will be assumed that principal spillways and regulating outlets provided for special
1203 functions will operate to normal design discharge capabilities during the spillway design flood,
1204 provided appropriate analyses show:

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1205 1. That control gates and structures are suitably designed to operate reliably under
1206 maximum heads for durations likely to be involved and risks of blockage by debris are minimal;

1207 2. That access roads and passages to gate regulating controls would be safely passable by
1208 operating personnel under spillway design flood conditions; and

1209 3. That there are no other substantial reasons for concluding that outlets would not
1210 operate safely to fill design capacity during the spillway design flood.

1211 B. If there are reasons to doubt that any of the above basic requirements might not be
1212 adequately met under spillway design flood conditions, the "dependable" discharge capabilities
1213 of regulating outlets shall be assumed to be less than 100% of design capabilities, generally as
1214 outlined in the following subsections C through G of this section.

1215 C. Any limitations in safe operating heads, maximum velocities to be permitted through
1216 structures or approach channels, or other design limitations shall be observed in establishing
1217 "dependable" discharge rating curves to be used in routing the spillway design flood hydrograph
1218 through the reservoir.

1219 D. If intakes to regulating outlets are likely to be exposed to dangerous quantities of
1220 floating ~~drift~~ debris, sediment depositions or ice hazards prior to or during major floods, the
1221 dependable discharge capability during the spillway design flood shall be assumed to be zero.

1222 E. If access roads or structural passages to operating towers or controls are likely to be
1223 flooded or otherwise unusable during the spillway design flood, the dependable discharge
1224 capability of regulating outlets will be assumed to be zero for those period of time during which
1225 such conditions might exist.

1226 F. Any deficiencies in discharge performance likely to result from delays in the operation
1227 of gates before attendants could be reasonably expected to reach the control for in estimating
1228 "dependable" discharge capabilities to be assumed in routing the spillway design flood through
1229 reservoir. Reports on design studies shall indicate the allowances made for possible delays in
1230 initiating gate operations. Normally, for projects located in small basins, where critical spillway
1231 design flood inflows may occur within several hours after intense precipitation, outflows through
1232 any regulating outlets that must be opened after the flood begins shall be assumed to be zero for
1233 an appropriate period of time subsequent to the beginning of intense rainfall.

1234 G. All gates, valves, conduits and concrete channel outlets shall be designed and
1235 constructed to prevent significant erosion or damage to the impounding structure or to the
1236 downstream outlet or channel.

1237
1238 Statutory Authority: §10.1-605 of the Code of Virginia.
1239 Historical Notes: Derived from VR625-01-00 §5.4, eff. February 1, 1989.

1240

1241 **4VAC50-20-280. Drain requirements.**

1242 All new impounding structures regardless of their hazard potential classification, shall
1243 include a device to permit draining of the impoundment within a reasonable period of time as
1244 determined by the owner's licensed professional engineer, subject to approval by the director.

1245
1246 Statutory Authority: §10.1-605 of the Code of Virginia.
1247 Historical Notes: Derived from VR625-01-00 §5.5, eff. February 1, 1989.

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1248

1249 **4VAC50-20-290. Life of the impounding structure.**

1250 Components of the impounding structure, the impoundment, the outlet works, drain
1251 system and appurtenances shall be durable **or replaced** in keeping with the design and planned
1252 life of the impounding structure.

1253

1254

1255

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

1256

1257 **4VAC50-20-300. Additional design requirements.**

1258 A. Flood routings shall start at or above the elevation of the crest of the lowest ungated
1259 outlet. **Freeboard determination and justification must be addressed by the owner's engineer.**

1260 B. All elements of the impounding structure and impoundments shall conform to sound
1261 engineering practice. Safety factors, design standards and design references that are used shall be
1262 included with the design report.

1263 C. Inspection devices may be required by the director for use by inspectors, owners or the
1264 director in conducting inspections in the interest of structural integrity during and after
1265 completion of construction and during the life of the impounding structure.

1266

1267

1268

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

1269

1270 **4VAC50-20-310. Plans and specifications.**

1271 The plans and specifications for a proposed impounding structure shall consist of a
1272 detailed engineering design report that includes engineering drawings and specifications, with
1273 the following as a minimum:

1274 1. The name of the project; the name of the owner; classification of the impounding
1275 structure as set forth in this chapter; designated access to the project and the location with respect
1276 to highways, roads, streams and existing impounding structures and impoundments that would
1277 affect or be affected by the proposed impounding structure.

1278 2. Cross-sections, profiles, logs of test borings, laboratory and in situ test data, drawings
1279 of principal and emergency spillways and other additional drawings in sufficient detail to
1280 indicate clearly the extent and complexity of the work to be performed.

1281 3. The technical provisions, as may be required to describe the methods of the
1282 construction and construction quality control for the project.

1283 4. Special provisions, as may be required to describe technical provisions needed to
1284 ensure that the impounding structure is constructed according to the approved plans and
1285 specifications.

1286

1287

1288

1289

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

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1290 **4VAC50-20-320. Acceptable design procedures and references.**

1291 The following are acceptable as design procedures and references:

1292 1. The design procedures, manuals and criteria used by the United States Army Corps of
1293 Engineers.

1294 2. The design procedures, manuals and criteria used by the United States Department of
1295 Agriculture, Natural Resources Conservation Service.

1296 3. The design procedures, manuals and criteria used by the United States Department of
1297 the Interior, Bureau of Reclamation.

1298 4. The design procedures, manuals and criteria used by the United States Department of
1299 Commerce, National Weather Service.

1300 5. Other design procedures, manuals and criteria that are accepted as current, sound
1301 engineering practices, as approved by the director prior to the design of the impounding
1302 structure.

1303
1304 Statutory Authority: §10.1-605 of the Code of Virginia.

1305 Historical Notes: Derived from VR625-01-00 §5.9, eff. February 1, 1989; Amended, Virginia Register Volume 18,
1306 Issue 14, eff. July 1, 2002.

1307 Effect of Amendment: The July 1, 2002 amendment, in paragraph 2, changed "Soil" to "Natural Resources" before
1308 "Conservation"; and, in paragraph 3, changed "or Interior" to "of the Interior".

1309

1310 **4VAC50-20-322. Other applicable dam safety references.**

1311 Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners, U.S.
1312 Department of Homeland Security, Federal Emergency Management Agency, October 1998,
1313 Reprinted January 2004; FEMA 64

1314
1315 Federal Guidelines for Dam Safety: Selecting and Accommodating Inflow Design Floods for
1316 Dams, U.S. Department of Homeland Security, Federal Emergency Management Agency,
1317 October 1998, Reprinted April 2004; FEMA 94

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1319 **FORMS**

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1321 Dam Owner's Annual Inspection Form, DCR 199-098 (rev. 12/01).

1322

1323 Operation and Maintenance Application ~~Class I, II and III~~ High and Significant Hazard
1324 Impounding Structures, DCR 199-099 (rev. 12/01).

1325

1326 As-Built Report for ~~Class I, II and III~~ High, Significant, and Low Hazard Impounding
1327 Structures, DCR 199-100 (rev. 12/01).

1328

1329 Design Report for the Construction/Alteration of Impounding Structures, DCR 199-101
1330 (rev. 12/01).

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DISCUSSION DRAFT – NOT APPROVED

1332 ~~Emergency Action Plan for Class I, Class II and Class III Impounding Structures, DCR~~
1333 ~~199-103 (rev. 12/01).~~

1334
1335 Inventory Report for ~~Class III and Class IV~~ Low Hazard Impounding Structures, DCR
1336 199-104 (rev. 12/01).

1337
1338 Reinspection Report for ~~Class I and II~~ High and Significant Hazard Impounding
1339 Structures, DCR 199-105 (rev. 12/01).

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1341 Agricultural Certification for Impounding Structures, DCR 199-106 (rev. 12/01).

1342
1343 Transfer Application for Impounding Structures, DCR 199-107 (rev. 12/01).

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1347 § 3.1-249.27. Definitions.
1348 "Agricultural commodity" means any plant or part thereof, or animal, or animal product,
1349 produced by a person, including farmers, ranchers, vineyardists, plant propagators, Christmas
1350 tree growers, aquaculturists, floriculturists, orchardists, foresters, nurserymen, wood treaters not
1351 for hire, or other comparable persons, primarily for sale, consumption, propagation, or other use
1352 by man or animals.

1353
1354 § 3.1-337. Definitions.
1355 (1) "Agricultural product" means any horticultural, viticultural, dairy, livestock, poultry, bee or
1356 other farm or garden product;

1357