# WEST VIRGINIA
# SECRETARY OF STATE
KEN HECHLER
# ADMINISTRATIVE LAW DIVISION
Form #3

Do Not Mark In This Box
FILED
Dec 15 2 54 PM '94
OFFICE OF WEST VIRGINIA SECRETARY OF STATE

## NOTICE OF AGENCY APPROVAL OF A PROPOSED RULE

## AND

## FILING WITH THE LEGISLATIVE RULE-MAKING REVIEW COMMITTEE

AGENCY: Division of Environmental Protection, Office of Water Resources TITLE NUMBER: 47

CITE AUTHORITY §22-14-4

AMENDMENT TO AN EXISTING RULE: YES X NO ____

IF YES, SERIES NUMBER OF RULE BEING AMENDED: 34

TITLE OF RULE BEING AMENDED: Dam Safety Regulations

IF NO, SERIES NUMBER OF RULE BEING PROPOSED: ____

TITLE OF RULE BEING PROPOSED: ____

---

THE ABOVE PROPOSED LEGISLATIVE RULE HAVING GONE TO A PUBLIC HEARING OR A PUBLIC COMMENT PERIOD IS HEREBY APPROVED BY THE PROMULGATING AGENCY FOR FILING WITH THE SECRETARY OF STATE AND THE LEGISLATIVE RULE-MAKING REVIEW COMMITTEE FOR THEIR REVIEW.

Roger N Hall

David C. Callaghan, Director
Division of Environmental Protection

13.40 w/o Comments
18.80

**DIVISION OF ENVIRONMENTAL PROTECTION**

GASTON CAPERTON
GOVERNOR

10 McJunkin Road
Nitro, WV 25143-2506

DAVID C. CALLAGHAN
DIRECTOR

August 15, 1994

Ms. Judy Cooper
Director, Administrative Law Division
Secretary of State's Office
Building 1, Suite 157K
Charleston, West Virginia 25305

RE: CSR-47-34 - Dam Safety Regulations

Dear Ms. Cooper:

This is to advise you that I am giving approval for the filing of the above-captioned rule with your Office and with Legislative Rule-Making Review Committee as an agency approved rule.

Your cooperation in this regard is very much appreciated. If you have any questions or require additional information, please feel free to contact Roger T. Hall at 759-0515.

Sincerely yours,

David C. Callaghan
Commissioner
Bureau of Environment

DCC;RTH:cc

Attachment

## Circumstances Requiring Modification of Rule

47 C.S.R. 34
Dam Safety Regulation
Legislative Rule

This is an amendment to the Dam Safety Regulations, 47 C.S.R. 34 that provides necessary guidance to amendments passed during the 1993 Legislative session related to design storm requirements. Hazard classification clarification related to the type and amount of damage expected after a failure, determination of risk to persons on highways, use of risk assessment for possible design storm reduction, concrete dam stability requirements, clarification of drain pipe requirements, and end of jurisdiction determination criteria for abandonment of dams are also included.

FISCAL NOTE FOR PROPOSED RULE

Rule Title: Dam Safety Regulations, 47 C.S.R. 34

Type of Rule: X Legislative ___ Interpretive ___ Procedural

Agency: Division of Environmental Protection

Address: Office of Water Resources, 1201 Greenbrier Street, Charleston, West Virginia 25311

| 1. Effect of Proposed Rule | ANNUAL Increase | ANNUAL Decrease | FISCAL YEAR Current | FISCAL YEAR Next | FISCAL YEAR Thereafter |
|---|---|---|---|---|---|
| Estimated Total Cost | $ None | None | $185,780 | $191,709 | $191,709 |
| Personal Services | $ None | None | $158,544 | $162,133 | $162,133 |
| Current Expenses | $ None | None | $ 26,236 | $ 28,776 | $ 28,776 |
| Repairs & Alterations | $ None | $200 | $ 1,000 | $ 800 | $ 800 |
| Equipment | $ None | None | $ 0 | $ 0 | $ 0 |
| Other | $ None | None | $ 0 | $ 0 | $ 0 |

2. Explanation of above estimates: The proposed amendments to the Dam Safety Regulations do not change the program's operating cost and will decrease revenue from fees by an estimated $200 per year.

3. Objectives of this rule: The rule establishes the provisions necessary to assure protection of public safety relative to dams. The proposed amendment provides for expanded guidance for application of storm requirements enacted by the 1992 Legislature. Hazard classification clarification related to the type and amount of damage expected after a failure, determination of risk to persons on highways, use of risk assessment for possible design storm reduction, concrete dam stability requirements, clarification of drain pipe requirements, and end of jurisdiction determination criteria for abandonment of dams are also included.

4. Explanation of Overall Economic Impact of Proposed Rule.

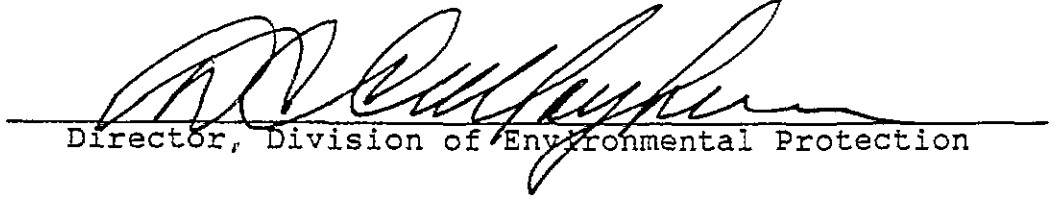
   A. Economic Impact on State Government. Very modest decrease to Special Revenue - approximately $200 per year.

   B. Economic Impact on Political Subdivisions; Specific Industries; Specific groups of citizens. Approximately 15 dam owners holding certificates of approval under a revised hazard classification will experience a reduced registration fee.

   C. Economic Impact on Citizens/ Public at Large. None.

Date: June 30, 1994

Signature of Agency Head or Authorized Representative



Director, Division of Environmental Protection

DATE: August 15, 1994

TO: Legislative Rule-Making Review Committee

FROM: Division of Environmental Protection, Office of Water Resources

LEGISLATIVE RULE TITLE: Dam Safety Regulations

1. Authorizing statute(s) citation: W. Va. Code 22-14-4

2.a. Date filed in State Register with Notice of Hearing: June 30, 1994

2.b. What other notice, including advertizing, did you give of the hearing? Notice of the hearing was published in eight newspapers as a Class I legal advertisement

2.c. Date of hearing(s): August 1, 1994

2.d. Attach list of persons who appeared at hearing, comments received, amendments, reasons for amendments;

Attached XX No comments received ____

2.e. Date agency approved proposed Legislative Rule filed in State Register following public hearing: August 19, 1994

2.f. Name and telephone of agency contact: Brian R. Long - 558-0320

3. If the statute under which the rule was promulgated and submitted requires certain findings and determinations to be made as a condition precedent to their promulgation: None.

3.a. Date on which a notice of the time and place of hearing for the taking of evidence and a general description of the issues to be decided was filed in the State Register: _____

3.b. Date of hearing: _____

3.c. Date the required findings and determinations together with reasons therefor were filed in the State Register: _____

3.d. Findings and determinations, and reasons (attached).

# PREAMBLE TO A PROPOSED RULE
# CONCERNING
# DAM SAFETY REGULATIONS

**AGENCY:** Bureau of Environment; Division of Environmental Protection.

**REGULATION:** 47 CSR 34, "Dam Safety Regulations."

**ACTION:** Filing of a Proposed Rule, Notice of a Public Hearing, and Notice of a Public Comment Period.

**SUMMARY:** The proposed amendment to the Dam Safety Regulations provides expanded guidance for application of storm requirements enacted by the 1992 Legislature. Hazard classification clarification related to the type and amount of damage expected after a failure, determination of risk to persons on highways, use of risk assessment for possible design storm reduction, concrete dam stability requirements, clarification of drain pipe requirements, and end of jurisdiction determination criteria for abandonment of dams are also included.

A Public Hearing will be held as follows:

August 1, 1994, 7:00 p.m.

Division of Environmental Protection
Nitro Office - Training Room
10 McJunkin Road
Nitro, West Virginia

Written comments with postmarks prior to 4:00 pm, August 8, 1994 will be accepted. Written comments should be sent to:

Brian Long
Division of Environmental Protection
Office of Water Resources
1201 Greenbrier Street
Charleston, West Virginia 25311

DAM SAFETY REGULATIONS

TABLE OF CONTENTS


§ 47-34-1. General. . . . . 1
1.1. Scope and Purpose. . . . . 1
1.2. Authority. . . . . 1
1.3. Filing Date. . . . . 1
1.4. Effective Date. . . . . 1
1.5. Amendment of Existing Rule. . . . . 1

§ 47-34-2. Definitions. . . . . 1
2.1. "Abandonment" . . . . . 1
2.2. "Act" . . . . . 1
2.3. "Appurtenances" . . . . . 1
2.4. "Assessment Officer" . . . . . 1
2.5. "Average Time Headway" . . . . . 1
2.6. "Breach" . . . . . 1
2.7. "Bridge" . . . . . 2
2.8. "Certificate of Approval" . . . . . 2
2.9. "Channel Protection" . . . . . 2
2.10. "Dam" . . . . . 2
2.11. "Dam Safety Section" . . . . . 3
2.12. "Dangerous Condition" . . . . . 3
2.13. "Design Storm" . . . . . 3
2.14. "Director" . . . . . 3
2.15. "Diversion Ditch" . . . . . 3
2.16. "Embankment" . . . . . 3
2.17. "Emergency Condition" . . . . . 3
2.18. "Emergency Spillway" . . . . . 3
2.19. "Enforcement Action" . . . . . 3
2.20. "Engineer" or "Registered Professional Engineer" . . . . . 3
2.21. "Freeboard" . . . . . 3
2.22. "Geotechnical Engineering" . . . . . 4
2.23. "Hazard Classification" . . . . . 4
2.24. "High Risk Highway" . . . . . 4
2.25. "Hydraulics" . . . . . 4
2.26. "Hydrologic Analysis" . . . . . 4
2.27. "Hydrology" . . . . . 4
2.28. "Impoundment" . . . . . 4
2.29. "Incised Reservoir" . . . . . 4
2.30. "Low Risk Highway" . . . . . 4
2.31. "Major Damage" . . . . . 4
2.32. "Natural Bed" . . . . . 5
2.33. "Natural Drainway" . . . . . 5
2.34. "Minor Damage" . . . . . 5
2.35. "Notice of Civil Administrative Penalty" . . . . . 5
2.36. "Notice of Dismissal" . . . . . 5
2.37. "P100" . . . . . 5
2.38. "Person" . . . . . 5
2.39. "Piping" . . . . . 6
2.40. "Principal Spillway" . . . . . 6
2.41. "Probable Maximum Precipitation" or "PMP" . . . . . 6
2.42. "Project Area" . . . . . 6
2.43. "Removal" . . . . . 6
2.44. "Roadfill" . . . . . 6
2.45. "Safety Factor" or "Factor of Safety" . . . . . 6
2.46. "Sediment" . . . . . 6
2.47. "Serious Problem" . . . . . 6
2.48. "Significant Harm to the Environment" . . . . . 6
2.49. "Site" . . . . . 7
2.50. "Subsidence" . . . . . 7

2.51. "Violator" . . . . . 7
2.52. "Written Decision" . . . . . 7

§ 47-34-3. Classification of Dams. . . . . 7
3.1. Types of Dams . . . . . 7
3.1.1. Embankment Dams . . . . . 7
3.1.2. Gravity Dams . . . . . 7
3.1.3. Waste Disposal Dams . . . . . 7
3.1.4. Dams of Multiple Type . . . . . 7
3.2. Dam-Related Measurements. . . . . 7
3.2.1. Measuring Dam Height . . . . . 7
3.2.2. Measuring Reservoir Volume . . . . . 8
3.2.3. Incised Reservoirs . . . . . 8
3.3. Dams in Series . . . . . 8
3.4. Incidental Dams. . . . . 8
3.4.1. Roadfills. . . . . 8
3.4.2. Bridges. . . . . 8
3.4.3. Diversions . . . . . 8
3.4.4. Stream Encroachments . . . . . 8
3.5. Classification of Dams . . . . . 9
3.5.1. Changes in Dam Classification . . . . . 9
3.5.2. Hazard Classifications. . . . . 9
3.5.2.a. Class 1 (High Hazard) Dams . . . . . 9
3.5.2.b. Class 2 (Significant Hazard) Dams . . . . . 9
3.5.2.c. Class 3 (Low Hazard) Dams . . . . . 10
3.5.2.d. Class 4 (Negligible Hazard) Dams . . . . . 10
3.5.3. Hazard Evaluation. . . . . 10
3.5.3.a. Downstream Hazards . . . . . 10
3.5.3.b. Dam Break Analysis . . . . . 10
3.5.3.c. Upstream Hazards . . . . . 11
3.5.4. Risk Assessment . . . . . 11
3.5.4.a. Dwellings or Other Buildings Affected Downstream . . . . . 11
3.5.4.b. Highways Affected Downstream . . . . . 11
4.1. Certificate Required . . . . . 12
4.2. Certificate Issuance. . . . . 12
4.3. Hearings Prior to Certificate Issuance . . . . . 12
4.4. Certificate Revocation or Suspension . . . . . 13
4.5. Certificate Terms and Conditions . . . . . 13
4.6. Approval to Impound Water . . . . . 13
4.7. Other Approvals . . . . . 13
4.7.1. Waterways Under State or Federal Jurisdiction . . 13
4.7.2. Wetlands . . . . . 13

§ 47-34-5. Application Procedures. . . . . 13
5.1. Application Preparation and Submission . . . . . 13
5.2. Application Review. . . . . 14

§ 47-34-6. Plans and Specifications. . . . . 14
6.1. Plans and Specifications . . . . . 14
6.2. Engineer's Signature and Seal Required . . . . . 14
6.3. Engineering Practices . . . . . 14
6.3.1. Standard Practices . . . . . 14
6.3.2. Experimental Practices . . . . . 14
6.4. Plan Package Organization . . . . . 14
6.4.1. Project Narrative . . . . . 15
6.4.2. Construction Sequence and Schedule . . . . . 15
6.4.3. Project Specifications . . . . . 16
6.4.4. Maps and Drawings. . . . . 17
6.4.5. Inventory of Protected Sites . . . . . 18
6.4.6. Erosion and Sediment Control . . . . . 19

§ 47-34-7. Design Requirements. . . . . 19
7.1. Hydrologic Considerations. . . . . 19
7.1.1. General Hydrologic Requirements. . . . . 20
7.1.1.a. Hydrologic Investigation. . . . . 20
7.1.1.b. Design Storm Requirements . . . . . 20
7.1.1.b.A. Class 1 Dams . . . . . 20
7.1.1.b.B. Class 2 Dams . . . . . 20
7.1.1.b.C. Class 3 Dams . . . . . 20
7.1.1.b.D. Class 4 Dams . . . . . 20
7.1.1.c. Antecedent Moisture Conditions . . . . . 20
7.1.1.d. Flood Routings . . . . . 21
7.1.2. Specific Hydrologic Requirements. . . . . 21
7.1.2.a. Embankment Dams. . . . . 21
7.1.2.a.A. Storage and Discharge. . . . . 21
7.1.2.a.B. Surface Drainage Control . . . . . 21
7.1.2.a.C. Spillway Frequency of Operation . . . 21
7.1.2.a.D. Overtopping Embankments . . . . . 22
7.1.2.b. Gravity Dams . . . . . 22
7.1.2.c. Waste Disposal Dams. . . . . 22
7.1.2.c.A. Storage and Discharge . . . . . 22
7.2. Hydraulic Considerations. . . . . 22
7.2.1. General Hydraulic Requirements. . . . . 23
7.2.1.a. Hydraulic Analysis . . . . . 23
7.2.2. Specific Hydraulic Requirements. . . . . 23
7.2.2.a. Open Channels . . . . . 23
7.2.2.a.A. Stage Discharge . . . . . 23
7.2.2.a.B. Water Surface Profiles . . . . . 23
7.2.2.a.C. Hydraulic Jumps . . . . . 23
7.2.2.a.D. Critical Flows . . . . . 23
7.2.2.a.E. Super-elevation . . . . . 23
7.2.2.b. Closed Conduit Systems . . . . . 23
7.2.2.b.A. Risers and Drop Inlets . . . . . 23
7.2.2.b.B. Stage Discharge . . . . . 23
7.2.2.b.C. Slug Flow . . . . . 24
7.3. Geotechnical Considerations. . . . . 24
7.3.1. Geotechnical Investigation . . . . . 24
7.3.1.a. Project Area Survey . . . . . 24
7.3.1.b. Borrow Areas . . . . . 24
7.3.2. Laboratory Testing . . . . . 24
7.3.3. Geotechnical Evaluation . . . . . 24
7.3.3.a. Seepage Analysis . . . . . 24
7.3.3.a.A. Foundation Treatment . . . . . 25
7.3.3.b. Foundation Stability . . . . . 25
7.3.3.c. Landslides . . . . . 25
7.4. Structural Considerations. . . . . 25
7.4.1. General Structural Requirements . . . . . 25
7.4.1.a. Structural Materials . . . . . 25
7.4.1.a.A. Earth Materials . . . . . 25
7.4.1.a.B. Concrete Design . . . . . 25
7.4.2. Specific Structural Requirements. . . . . 26
7.4.2.a. Embankment Dams. . . . . 26
7.4.2.a.A. Selection of Materials . . . . . 26
7.4.2.a.B. Seepage and Piping Control . . . . . 26
7.4.2.a.C. . . . . 26
7.4.2.a.D. Embankment Stability . . . . . 27
7.4.2.a.E. Overtopping Embankments. . . . . 28
7.4.2.b. Gravity Dams. . . . . 29
7.4.2.b.A. Stability Loading Conditions . . . . 29
7.4.2.b.B. Gravity Dam Stability. . . . . 29
7.4.2.c. Waste Disposal Dams . . . . . 29
7.4.2.d. Spillways . . . . . 29
7.4.2.d.A. Conduit Spillways . . . . . 29

7.4.2.d.B. Open Spillways . . . . . 31
7.4.2.e. Water Supply Pipes . . . . . 32
7.5. Miscellaneous Considerations. . . . . 32
7.5.1. Erosion and Sediment Control . . . . . 32
7.5.2. Waste Disposal Areas . . . . . 32
7.5.3. Instrumentation . . . . . 32
7.5.3.a. Piezometers or Observation Wells . . . . . 32
7.5.3.b. Survey Monuments . . . . . 32
7.5.4. Staged Construction . . . . . 33

§ 47-34-8. Construction or Modification of a Dam. . . . . 33
8.1. Construction Requirements. . . . . 33
8.1.1. Notification of the Commencement of Construction . . . . . 33
8.1.2. Conformance with Plans . . . . . 33
8.1.3. On-Site Documents . . . . . 33
8.1.4. Adverse Weather Conditions . . . . . 33
8.1.5. Clearing and Grubbing . . . . . 33
8.1.6. Foundation Preparation - . . . . . 34
8.1.7. Placement of Materials. . . . . 34
8.1.8. Grading. . . . . 34
8.1.9. Spillways and Appurtenances. . . . . 34
8.1.10. Minimum Stream Flow . . . . . 35
8.1.11. Blasting . . . . . 35
8.1.12. Storm Water Discharge . . . . . 35
8.1.13. Erosion and Sediment Control. . . . . 35
8.1.13.a. General Requirements . . . . . 35
8.1.13.b. Specific Requirements . . . . . 36
8.1.13.b.A. Location of Sediment Control Devices . . . . . 36
8.1.13.b.B. Removal of Sediment Control Devices . 36
8.1.13.b.C. Cleaning Frequency . . . . . 36
8.1.13.b.D. Temporary Seeding and Mulching . . . 36
8.1.13.b.E. Water Routing . . . . . 36
8.1.13.b.F. In-Stream Treatment . . . . . 36
8.1.13.b.G. Sediment Control During Construction . . . . . 37
8.1.13.b.H. Permanent Erosion Measures . . . . . 37
8.1.14. Disposal of Construction Wastes. . . . . 37
8.1.14.a. General Disposal Requirements . . . . . 37
8.1.14.b. Specific Disposal Requirements. . . . . 37
8.1.14.b.A. Surplus Waste Materials . . . . . 37
8.1.14.b.B. Organic Waste Materials . . . . . 37
8.1.14.b.C. Concrete Waste Materials . . . . . 37
8.1.14.b.D. Other Waste Materials . . . . . 37
8.1.14.b.E. Off-Site Waste Materials . . . . . 37
8.1.15. Dust Abatement . . . . . 37
8.1.16. Access Roads . . . . . 38
8.2. Quality Control. . . . . 38
8.2.1. Construction Monitoring. . . . . 38
8.2.2. Materials Testing . . . . . 38
8.2.2.a. Concrete Testing . . . . . 38
8.2.2.b. Earth Fill Testing . . . . . 38
8.2.2.c. Filter Materials Testing . . . . . 38
8.3. Construction Inspections. . . . . 39
8.3.1. Inspections During Construction. . . . . 39
8.3.2. Final Construction Inspection . . . . . 39
8.3.3. Acceptance of Construction . . . . . 39
8.3.4. Completed Dams . . . . . 39
8.4. Construction Reporting Requirements. . . . . 39
8.4.1. Monthly Progress Reports During Construction . . 40
8.4.2. Post-Construction Inspection Reports . . . . . 40

§ 47-34-9. Breaching of a Dam. . . . . 40
9.1. Application to Breach a Dam . . . . . 40
9.1.1. Plan Package Requirements . . . . . 40
9.2. Breach Dimensions . . . . . 40
9.3. Breach Channel . . . . . 40
9.4. Safety . . . . . 40
9.5. Blasting . . . . . 41
9.6. Erosion and Sediment Control . . . . . 41
9.7. Placement of Earthen Material . . . . . 41
9.8. Placement of Non-Earthen Material . . . . . 41
9.9. Galleries and Drains . . . . . 41
9.10. Safety of Remaining Structure . . . . . 41
9.11. Construction Practices . . . . . 42

§ 47-34-10. Removal of a Dam. . . . . 42
10.1. Application to Remove a Dam . . . . . 42
10.2. Removal Requirements . . . . . 42
10.3. Safety . . . . . 42
10.4. Blasting . . . . . 42
10.5. Erosion and Sediment Control . . . . . 42
10.6. Placement of Earthen Material . . . . . 43
10.7. Placement of Non-Earthen Materia . . . . . 43
10.8. Safety of Remaining Structure . . . . . 43
10.9. Construction Practices . . . . . 43

§ 47-34-11. Abandonment of a Dam. . . . . 43
11.1. Application to Abandon a Dam . . . . . 43
11.2. Reservoir Elimination . . . . . 43
11.3. Embankment Stability . . . . . 44
11.4. Diversion System . . . . . 44
11.5. Sealing Conduits . . . . . 44
11.6. Erosion and Sediment Control . . . . . 44
11.7. Soil and Vegetative Cover . . . . . 44
11.8. Retention of Jurisdiction . . . . . 44
11.9. Final Approval of Abandonment . . . . . 44

§ 47-34-12. Reduction or Enlargement of a Dam. . . . . 45
12.1. Reduction of Dam Height To Less Than Jurisdiction. . . . . 45
12.2. Enlargement of a Structure to Jurisdiction. . . . . 45

§ 47-34-13. Dams Completed Before July 1, 1973. . . . . 46
13.1. Complete Application Required . . . . . 46
13.2. Performance Requirements . . . . . 46
13.3. Plan Package Requirements . . . . . 46

§ 47-34-14. Sale or Transfer of a Dam. . . . . 46
14.1. Notification and Documentation . . . . . 46

§ 47-34-15. Dam Operations and Safety. . . . . 47
15.1. Safe Operations . . . . . 47
15.2. Operations Plan . . . . . 47
15.2.1. Plan Contents . . . . . 47
15.2.2. Plan Implementation . . . . . 47
15.3. Releasing Water . . . . . 47
15.3.1. Emergency Releases of Water . . . . . 47
15.3.2. Low Flow Augmentation . . . . . 48
15.4. Dam Safety Inspections . . . . . 48
15.4.1. Inspections by the Dam Owner . . . . . 48
15.4.2. Inspections by the Director . . . . . 48
15.4.3. Inspections by the Owner's Engineer . . . . . 48
15.4.4. Inspection of Dams with Serious Problems . . . . 48
15.5. Dam Safety Inspection Reports. . . . . 49

15.5.1. Inspection Reports for Completed Dams . . . . . 49
15.5.2. Inspection Reports for Dams with Serious Problems . . . . . 49
15.6. Monitoring Plans . . . . . 49
15.7. Emergency Action Plans . . . . . 50
15.8. Emergency Procedures. . . . . 50
15.8.1. Emergency Condition . . . . . 50
15.8.2. Dangerous Condition . . . . . 50
15.8.3. Evaluation of Dangerous Conditions . . . . . 50
15.9. Dam Owner Not Relieved of Responsibility . . . . . 50

§ 47-34-16. Dam Maintenance. . . . . 51
16.1. General Maintenance Requirements. . . . . 51
16.1.1. Required Maintenance . . . . . 51
16.1.2. Maintenance Plan . . . . . 51
16.2. Specific Maintenance Requirements. . . . . 51
16.3. Routine Maintenance. . . . . 51

§ 47-34-17. Dam Repairs. . . . . 52
17.1. General Repair Requirements . . . . . 52
17.1.1. Routine Repairs (No Certificate Required) . . . . 52
17.1.2. Major Repairs (Certificate Required) . . . . . 52
17.2.1. Removal of Trees and Tree Roots . . . . . 53

§ 47-34-18. Application and Annual Registration Fees. . . . . 53
18.1. Application Fees . . . . . 53
18.2. Annual Registration Fees . . . . . 53

§ 47-34-19. Civil Administrative Penalties. . . . . 54
19.1. Enforcement Actions. . . . . 54
19.1.1. General . . . . . 54
19.1.2. Enforcement Action Procedures . . . . . 54
19.2. Penalty Assessment Procedures. . . . . 54
19.2.1. Review of Enforcement Action and Penalty Calculation . . . . . 54
19.2.2. Notice of Civil Administrative Penalty . . . . . 55
19.3. Hearings and Appeals. . . . . 55
19.3.1. Right to Informal Hearing . . . . . 55
19.3.2. Notice and Scheduling of Informal Hearing . . . . 55
19.3.3. Informal Hearing Procedures . . . . . 55
19.3.4. Written Decision . . . . . 56
19.3.5. Request for Formal Hearing . . . . . 56
19.3.6. Request for Judicial Review . . . . . 56
19.4. Separate Civil Administrative Penalties. . . . . 56
19.5. Civil Administrative Penalty Calculation Procedures. . . . . 57
19.5.2. History of Violations (HOV) . . . . . 57
19.5.3. Good Faith Effort . . . . . 57
19.5.4. Maximum Assessed Penalty . . . . . 57
19.5.5. Penalty Without Good Faith Effort by Violator . . 57
19.5.6. Penalty With Good Faith Efforts by Violator . . . 57

TITLE 47
LEGISLATIVE RULES
BUREAU OF ENVIRONMENT
DIVISION OF ENVIRONMENTAL PROTECTION
OFFICE OF WATER RESOURCES

SERIES 34
DAM SAFETY REGULATIONS

**§ 47-34-1. General.**

1.1. Scope and Purpose. -- This legislative rule establishes requirements relating to the design, placement, construction, enlargement, alteration, removal, abandonment, and repair of dams in this State that fall within the definition set forth in Section ~~2.6~~ 2.10 of this rule. The scope of this rule does not extend to those dams ~~provided for in W. Va. Code §22-1-16.~~ that are related to coal activities.

1.2. Authority. -- W. Va. Code § ~~20-5B-4.~~ 22-14-4.

1.3. Filing Date. -- _____.

1.4. Effective Date. -- _____.

1.5. Amendment of Existing Rule. - This legislative rule amends the Dam Safety Regulations, 47 C.S.R. 34, filed ~~April 5, 1991~~ May 13, 1994 and made effective ~~April 22, 1991~~ June 1, 1994.

1.6. Relationship of rule to federal programs -- There is no counterpart federal regulation.

**§ 47-34-2. Definitions.**

2.1. "Abandonment" means to render a dam non-impounding by filling the reservoir created by that dam with solid materials and by diverting the natural drainway around the site.

2.2. "Act" means the West Virginia Dam Control and Safety Act, W. Va. Code § ~~20-5B-1~~ 22-14-1, et seq.

2.3. "Appurtenances" means any ancillary part of a dam or reservoir system which contributes to the operation or construction of the dam.

2.4. "Assessment Officer" means a person appointed by the director to carry out the review and hearing procedures outlined in this rule.

2.5. "Average Time Headway" means the number of seconds in one day divided by the average daily traffic.

~~2.5.~~ 2.6. "Breach" means partial removal of a dam, creating a channel through the dam at the original stream bottom elevation.

~~2.6.~~ 2.7. "Bridge" means a structure, including any abutments or supports appurtenant to that structure, which:

~~2.6.1.~~ 2.7.1. Meets the definition of "dam" set forth in ~~Section~~ 2.6 subsection 2.10 of this rule;

~~2.6.2.~~ 2.7.2. Is constructed across a natural drainway for the purpose of maintaining a pathway, railway, roadway, support structure, or other

passageway for transporting persons, traffic, or other static or moving loads; and

~~2.6.3.~~ 2.7.3. Has an opening under the structure to provide for the passage of normal stream flow.

~~2.7.~~ 2.8. "Certificate of Approval" means the approval in writing issued by the director to a person who has applied to the director for a certificate of approval which authorizes the person to place, construct, enlarge, alter, remove, abandon, or repair a dam and which specifies the conditions or limitations under which the work is to be performed by the applicant.

~~2.8.~~ 2.9. "Channel Protection" means any measure taken to prevent or control erosion, cavitation, or other destructive processes in channels such as diversion ditches and spillways.

~~2.9.~~ 2.10. "Dam" means an artificial barrier or obstruction --including any works appurtenant to it and any reservoir created by it -- which is or will be placed, constructed, enlarged, altered, or repaired so that it does or will impound or divert water and is or will be twenty-five (25) feet or more in height from the natural bed of a stream or watercourse measured at the downstream toe of the barrier and which does or can impound fifteen (15) acre-feet or more of water or is or will be six (6) feet or more in height from the natural bed of such stream or watercourse measured at the downstream toe of the barrier and which does or can impound fifty (50) acre-feet or more of water. The term "dam" does not include:

~~2.9.1.~~ 2.10.1. Any dam owned by the federal government;

~~2.9.2.~~ 2.10.2. Any dam for which the operation and maintenance thereof is the responsibility of the federal government;

~~2.9.3. Any slack water dam constructed and maintained in connection with public highways, streets, bridges, culverts, or viaducts;~~

~~2.9.4.~~ 2.10.3. Any farm pond constructed and used primarily for agricultural purposes -- including, but not limited, to livestock watering, irrigation, retention of animal wastes, and fish culture -- which has no potential to cause a loss of human life in the event of embankment failure; or

~~2.9.5.~~ 2.10.5. Structures which do not or will not impound water under normal conditions and which have a designed culvert or similar conveyance or such capacity as would be used under a highway at the same location: Provided, however, That the director may apply the provisions of W Va Code § ~~20-5B-10~~ 22-14-10 for hazardous, non-impounding structures which are brought to his or her attention,

~~2.10.~~ ~~"Dam Safety Office"~~ 2.11 "Dam Safety Section" means the Dam Safety ~~Office~~ Section of the Division of Environmental Protection of the West Virginia ~~Department of Commerce, Labor and Environmental Resources~~ Bureau of Environment.

~~2.11.~~ 2.12. "Dangerous Condition" means any structural or hydraulic condition of a dam or its appurtenances which may lead to:

~~2.11.1.~~ 2.12.1. Failure of the dam and possible loss of human life or substantial loss of property;

~~2.11.2.~~ 2.12.2. Harm to the public health or welfare; or

~~2.11.3.~~ 2.12.3. Significant harm to the environment.

2.12. 2.13. "Design Storm" means predicted precipitation of given intensity, frequency, and duration based upon National Weather Service data that is required to be considered in the design of a dam.

~~2.13.~~ 2.14. "Director" means the director of the Division of Environmental Protection of the West Virginia ~~Department of Commerce, Labor and Environmental Resources~~ Bureau of Environment or his or her authorized representative.

~~2.14.~~ 2.15. "Diversion Ditch" means a designed channel constructed for the purpose of collecting and transmitting surface runoff resulting from a given design storm.

~~2.15.~~ 2.16. "Embankment" means a constructed deposit of earth or waste materials, usually exhibiting at least one sloping face.

~~2.16.~~ 2.17. "Emergency Condition" means an imminently dangerous condition where failure of the dam is possible at any time.

~~2.17.~~ 2.18. "Emergency Spillway" means a hydraulic structure designed to discharge water in excess of that which an impoundment is designed to store or which cannot be passed through a principal spillway.

~~2.18.~~ 2.19. "Enforcement Action" means a written notification provided to an alleged violator by the director within fifteen (15) calendar days of an inspection, or in accordance with the provisions of the Act.

~~2.19.~~ 2.20. "Engineer" or "Registered Professional Engineer" means a person who by reason of his or her knowledge of mathematics, the physical sciences, and the principles of engineering, acquired by professional education and practical experience, is qualified to engage in the practice of professional engineering and holds a current certificate of registration issued by the State granting its licensee the privilege of practicing professional engineering in accordance with the provisions of W. Va. Code § 30-13-1 et seq.

~~2.20.~~ 2.21. "Freeboard" means the vertical distance between the lowest point of the crest of the embankment of a dam and the reservoir water surface.

~~2.21.~~ 2.22. "Geotechnical Engineering" means the application of soil mechanics, rock mechanics, and geology to the solution of problems involving engineering structures and their interaction with surrounding earth materials.

~~2.22.~~ 2.23. "Hazard Classification" means a classification rating assigned to a structure based upon engineering evaluations and judgments for predicting the danger to human life, property, and environment should a failure of the structure occur.

2.24. "High Risk Highway" means a roadway, roadfill, bridge, support structure, or other passageway for transporting persons, traffic, or other static or moving loads where the average time headway between vehicles in traffic is less than the duration of overtopping caused by the dam break flood wave.

~~2.23.~~ 2.25. "Hydraulics" means the study of the physical behavior of liquids, especially water, in natural or man-made systems or processes.

~~2.24.~~ 2.26. "Hydrologic Analysis" means a determination, using accepted engineering methods, to establish surface water runoff for a given design storm.

~~2.25.~~ 2.27. "Hydrology" means the science that deals with the occurrence and behavior of water in the atmosphere, on the ground, and underground.

~~2.26.~~ 2.28. "Impoundment" means a basin for the retention of water, sediment, or waste.

~~2.27.~~ 2.29. "Incised Reservoir" means an impoundment, or that portion of an impoundment, which has been excavated below the natural stream level into natural ground.

2.30. "Low Risk Highway" means a roadway, roadfill, bridge, support structure, or other passageway for transporting persons, traffic, or other static or moving loads where the average time headway between vehicles in traffic is greater than the duration of overtopping caused by the dam break flood wave.

2.31. "Major Damage" means destruction, ruin, collapse, or displacement of dwellings, commercial or industrial buildings, public highways or bridges, or important public utilities. Dwellings, buildings, public highways or bridges, or important public utilities will sustain major damage when:

2.31.1. The dwelling, commercial or industrial building, public highway or bridge, or important public utility is in the direct path of the dam break flood wave, or;

2.31.2. Important public utilities equipment or public highways or bridges will be harmed sufficiently to cause disruption of service, or to require repair or replacement of the important public utility equipment, or public highway or bridge, or;

2.31.3. The dwelling, commercial or industrial building or important public utility will experience more than 1.5 feet of flood rise due to the dam break flood wave above the lowest ground elevation adjacent to the outside foundation walls; or more than 1.5 feet of flood rise due to the dam break flood wave above the lowest floor elevation of the dwelling, commercial or industrial building or important public utility. The lower of the elevations shall govern.

~~2.28.~~ 2.32. "Natural Bed" means the lowest elevation of a stream, intermittent stream, or channel created by nature which has not been altered or changed by the actions of man.

~~2.29.~~ 2.33. "Natural Drainway" means any natural watercourse which may carry water to the tributaries and rivers of the watershed.

2.34. "Minor Damage" means insignificant harm to dwellings, commercial or industrial buildings, public highways or bridges, or public utilities that does not qualify as major damage.

~~2.30.~~ 2.35. "Notice of Civil Administrative Penalty" means a written notification provided to a violator by the director, by means of certified mail or personal service, assessing a civil administrative penalty. A notice of civil administrative penalty shall include:

~~2.30.1.~~ 2.35.1. A reference to the section of the statute, rule, regulation, order, or certificate of approval term allegedly violated;

~~2.30.2.~~ 2.35.2. A concise statement of the facts alleged to constitute the violation;

~~2.30.3.~~ 2.35.3. A statement of the amount of the initial civil administrative penalty to be imposed; and

~~2.30.4.~~ 2.35.4. A statement of the alleged violator's right to an informal hearing.

~~2.31.~~ 2.36. "Notice of Dismissal" means a written notification provided to a violator by the assessment officer or the director dismissing and vacating the civil administrative penalty. A notice of dismissal may be issued at any time

during the proceedings.

~~2.32.~~ 2.37. "P100" means the rainfall amount based upon a one hundred (100) year frequency, six (6) hour duration rainfall event (i.e, a 100-year, 6-hour storm).

~~2.33.~~ 2.38. "Person" means any public or private corporation, institution, association, society, firm, organization or company organized or existing under the laws of this or any other state or country; the State of West Virginia; any state governmental agency; any political subdivision of the State or of its counties or municipalities; sanitary district; public service district; drainage district; soil conservation district; watershed improvement district; partnership; trust; estate; person or individual; group of persons or individuals acting individually or as a group; or any other legal entity whatever. The term "person", when used in this rule, includes and refers to any authorized agent, lessee or trustee of any of the foregoing or receiver or trustee appointed by any court for any of the foregoing.

~~2.34.~~ 2.39. "Piping" means progressive internal erosion of earth material or adjacent unaltered material caused by water movement through embankment material with sufficient force to move soil particles, leading to the development of a channel or a hole.

~~2.35. "Primary Highway" means those roadways which are designated as interstate routes, United States numbered routes, or West Virginia numbered routes.~~

~~2.36.~~ 2.40. "Principal Spillway" means the hydraulic structure designed to discharge water stored between the normal pool and the emergency spillway invert elevations.

~~2.37.~~ 2.41. "Probable Maximum Precipitation" or "PMP" means the depth-duration-area rainfall event for a particular area that represents the maximization of the most critical meteorological conditions that are considered possible to occur.

~~2.38.~~ 2.42. "Project Area" means all areas physically affected by the construction of a dam including, but not limited to, the dam and its appurtenances, the reservoir area, construction zones, permanent or temporary access roads, borrow areas, materials storage areas, staging areas, and waste disposal areas.

~~2.39.~~ 2.43. "Removal" means complete elimination of the dam embankment or structure to restore the approximate original topographic contours of the valley.

~~2.40.~~ 2.44. "Roadfill" means a barrier or obstruction which:

~~2.40.1.~~ 2.44.1. Meets the definition of "dam" set forth in ~~Section 2.6~~ subsection 2.10 of this rule;

~~2.40.2.~~ 2.44.2. Is constructed across a natural drainway for the purpose of maintaining a roadway or similar crossing across that drainway; and

~~2.40.3.~~ 2.44.3. Has a culvert located in the drainway that is of sufficient size to prevent the normal impoundment of water.

~~2.41.~~ 2.45. "Safety Factor" or "Factor of Safety" means the ratio of the sum of the forces or moments resisting mass movement to the sum of the forces or moments tending to produce mass movement.

~~2.42. "Secondary Highway" means those roadways which are designated by the West Virginia Division of Highways as county numbered routes.~~

~~2.43.~~ 2.46. "Sediment" means solid material, either mineral or organic, resulting from the works of man that has been moved from its site of origin by water.

~~2.44.~~ 2.47. "Serious Problem" means a situation which left uncorrected may lead to a dangerous condition.

~~2.45.~~ 2.48. "Significant Harm to the Environment" means the degradation of a public or private surface water supply, the alteration of habitat that adversely affects wildlife, or the reduction of the productivity of agricultural land.

~~2.46.~~ 2.49. "Site" means the permanent location of a dam, including the dam and its appurtenances, the reservoir area, diversion ditches, and sediment control facilities.

~~2.47.~~ 2.50. "Subsidence" means a sinking, collapsing, or cracking of a portion of the earth's surface resulting from the presence of a void or voids beneath the surface.

~~2.48.~~ 2.51. "Violator" means the person who is alleged to have violated the Act, or any rule, regulation, notice to comply, order, or certificate of approval term imposed pursuant to the Act.

~~2.49.~~ 2.52. "Written Decision" means a written decision furnished to the violator concerning the director's final decision regarding the assessment of a civil administrative penalty and the reasons therefor.

**§ 47-34-3. Classification of Dams.**

3.1. Types of Dams.

~~3.1.1.~~ - For the purpose of this rule, dams are divided into ~~three~~ four general types:

~~3.1.1.a.~~ 3.1.1. Embankment Dams - Embankment dams are usually constructed of materials which exhibit rock-like or soil-like properties.

~~3.1.1.b.~~ 3.1.2. Gravity Dams - Gravity dams are usually constructed of concrete or masonry materials which form a rigid body.

~~3.1.1.c.~~ 3.1.3. Waste Disposal Dams - Waste disposal dams are usually constructed of waste materials such as fly ash or coal refuse. The reservoir is utilized to dispose of waste material, thereby creating a continuously decreasing freeboard condition.

~~3.1.2.~~ 3.1.4. Dams of Multiple Type - In cases where a dam exhibits properties of more than one type, such as gabion structures or roller-compacted concrete, the person or his or her agent must apply design techniques which are reasonably applicable to the particular structure involved.

3.2. Dam-Related Measurements.

3.2.1. Measuring Dam Height - The height of a dam is measured from the crest or uppermost point on the dam to the lowest point in the natural bed of the stream or watercourse at the downstream toe of the dam. Gravity overflow dams must be measured to the highest level which is greater than ten percent (10%) of the total crest length of the dam. The height of dams with sloping crests shall be determined by a weighted-average height above the natural

bed of the stream or watercourse, excluding spillways.

3.2.2. Measuring Reservoir Volume - For purposes of determining whether a dam meets the criteria set forth in ~~Section 2.6~~ subsection 2.10 of this rule as applied to reservoir volume calculations, the volume must be calculated at the crest elevation of the dam that is equivalent to the elevation used in determining the dam height.

3.2.3. Incised Reservoirs - The height of the embankment of an incised reservoir must be measured using the method set forth in ~~Section~~ paragraph 3.2.1 of this rule. Reservoir volume must be calculated from the crest of the embankment to the elevation of the lowest point in the natural bed of the stream or watercourse at the downstream toe. That portion of the water stored below stream grade shall not be included in determining whether a dam meets the criteria set forth in ~~Section 2.6~~ subsection 2.10 of this rule; however, it must be reported in the application as part of the total reservoir volume.

3.3. Dams in Series - If the director determines that a series or combination of water-impounding structures within the same watercourse, or within the tributaries of the watercourse, which cumulatively meet the definition of "dam" set forth in ~~Section 2.6~~ subsection 2.10 of this rule constitute a hazard to human life, and failure of one or more of the impounding structures may induce failure of any or all of the remaining impounding structures, he or she may require the owner or owners of each impounding structure to comply with the requirements of this rule.

3.4. Incidental Dams.

3.4.1. Roadfills.

3.4.1.a. If the director finds that a roadfill has become a hazard to human life or property through the frequent or continuous impoundment of water, he or she may order the owner of that roadfill to take all steps that are necessary to protect life or property in accordance with the emergency powers provided under W. Va. Code § ~~20-5B-10~~ 22-14-10.

3.4.1.b. A certificate of approval will not be required for roadfills.

3.4.2. Bridges.

3.4.2.a. If the director finds that a bridge has become a hazard to human life or property through the frequent or continuous impoundment of water, he or she may order the owner of that bridge to take all steps that are necessary to protect life or property in accordance with the emergency powers provided under W. Va. Code § ~~20-5B-10~~ 22-14-10.

3.4.2.b. A certificate of approval will not be required for bridges.

3.4.3. Diversions - A certificate of approval will be required for dikes or other structures used to divert water and otherwise meeting the definition of "dam" set forth in ~~Section 2.6~~ subsection 2.10 of this rule.

3.4.4. Stream Encroachments - If the director finds that a natural drainway has been restricted by filling or other artificial means so that the restriction can or does impound water, and the fill and resulting reservoir meets the height and storage requirements of a "Dam" as defined in this rule, he or she may order the fill removed or require a certificate of approval or both.

3.5. Classification of Dams - The applicant for a certificate of approval must propose the hazard classification for his or her dam based upon the

classification guidelines listed in ~~Section~~ paragraph 3.5.2 of this rule and the hazard evaluation performed pursuant to ~~Section~~ paragraph 3.5.3 of this rule. The classification proposed by an applicant is subject to approval by the director.

3.5.1. Changes in Dam Classification - The director will periodically review the hazard classification of each dam subject to this rule and may reclassify a dam if he or she determines that the hazard potential has changed. The owner shall be notified by the division of any hazard classification change.

3.5.2. Hazard Classifications.

~~3.5.2.a. Class A Dams — Class A dams are those dams located in rural or agricultural areas where failure may damage nonresidential and normally unoccupied buildings, rural or agricultural land, or secondary highways. Failure of a Class A dam would cause only a loss of the dam itself and a loss of property use, such as use of related roads, with little additional damage to adjacent property. Loss of human life resulting from failure of a Class A dam must be unlikely.~~

~~3.5.2.a.A. An impoundment exceeding forty (40) feet in height or two hundred (200) acre feet storage volume shall not be classified as a Class A dam.~~

~~3.5.2.a.B. A waste disposal dam, the failure of which may cause significant harm to the environment, shall not be designed as a Class A dam.~~

~~3.5.2.b. Class B Dams — Class B dams are those dams located in predominantly rural or agricultural areas where failure may damage isolated homes, primary highways, or minor railroads or may cause the interruption of public utility services. Failure of a Class B dam may cause great damage to property and project operations. Loss of human life resulting from failure of a Class B dam must be unlikely.~~

~~3.5.2.c. Class C Dams — Class C dams are those dams located where failure may cause a loss of human life or damage to homes, industrial and commercial buildings, important public utilities, primary highways, or main railroads. This classification must be used if failure may result in the loss of human life.~~

3.5.2.a. Class 1 (High Hazard) Dams - Class 1 dams are those dams located where failure may cause loss of human life or major damage to dwellings, commercial or industrial buildings, main railroads, important public utilities, or where a high risk highway may be affected or damaged. This classification must be used if failure may result in the loss of human life.

3.5.2.b. Class 2 (Significant Hazard) Dams - Class 2 dams are those dams located where failure may cause minor damage to dwellings, commercial or industrial buildings, important public utilities, main railroads, or cause major damage to unoccupied buildings, or where a low risk highway may be affected or damaged. The potential for loss of human life resulting from failure of a Class 2 dam must be unlikely.

3.5.2.c. Class 3 (Low Hazard) Dams - Class 3 dams are those dams located in rural or agricultural areas where failure may cause minor damage to nonresidential and normally unoccupied buildings, or rural or agricultural land. Failure of a Class 3 dam would cause only a loss of the dam itself and a loss of property use, such as use of related roads, with little additional damage to adjacent property. The potential for loss of human life resulting from failure of a Class 3 dam must be unlikely.

3.5.2.c.A. An impoundment exceeding forty (40) feet in height or two hundred (200) acre-feet storage volume shall not be classified as a Class 3 dam.

3.5.2.c.B. A waste disposal dam, the failure of which may cause significant harm to the environment, shall not be classified as a Class 3 dam.

3.5.2.d. Class 4 (Negligible Hazard) Dams - Class 4 dams are dams where failure is expected to have no potential for loss of human life, no potential for property damage and no potential for significant harm to the environment. Examples of Class 4 dams include: dams across rivers, failure of which under any conditions will not flood areas above normal streambank elevations; dams located in the reservoir of another dam which, under any conditions, can contain water released by failure of the Class 4 dam; and dams in series where the toe of the Class 4 dam(s) is in close proximity to the reservoir of a dam which can contain failure of the Class 4 dam(s) under any condition. In considering a request for a Class 4 designation, the director may require written concurrence from the owner(s) of downstream dams that may be affected by failure of the Class 4 dam. Approval for use of this classification is vested in the director, and will be based on engineering evaluation of the dam(s) and downstream areas in question.

3.5.3. Hazard Evaluation.

3.5.3.a. Downstream Hazards - In evaluating the hazard potential of a dam in order to determine its hazard classification, a complete evaluation of the downstream area which will be affected in the event of dam failure must be performed. A sudden flooding of inhabited land, accompanied by a water flow with damaging velocity, a wall of water, or the flooding of inhabited structures will all be deemed to have the potential to result in a loss of human life. The planned or potential future development of downstream areas must also be considered when evaluating hazard classification.

3.5.3.b. Dam Break Analysis - An applicant must perform a downstream breach analysis to evaluate and map the downstream inundation area under assumed normal conditions and overtopping failure conditions.

3.5.3.b.A. The director may waive the downstream breach analysis required under ~~Section~~ subparagraph 3.5.3.b of this rule for a ~~Class A or Class B~~ Class 2 or Class 3 or Class 4 dam where downstream conditions prevent any future introduction of new facilities or residences that thereby change the hazard classification of the dam.

3.5.3.c. Upstream Hazards - No dam shall be constructed which, during maximum pool conditions, will flood upstream dwellings, public utilities, primary highways, or main railroads unless otherwise approved by the director based upon site-specific conditions.

~~3.5.4. Risk Assessment - The director may consider a risk assessment for justifying a reduced structure hazard classification based upon failure of the dam by overtopping. The applicant for a certificate of approval must demonstrate through appropriate calculations that all affected dwellings will be inundated and evacuated prior to the dam failure and that property damage and potential loss of human life resulting from the dam failure will not be significantly increased from that which occurred immediately prior to the dam failure. The director will not consider risk assessment based upon planned evacuation, probability of inhabitation, or monetary recovery of property damage.~~

3.5.4. Risk Assessment - The applicant may propose a risk assessment according to the following provisions to determine the affect upon

dwellings or other buildings downstream (subparagraph 3.5.4.a. of this rule), to reduce the hazard classification (paragraph 3.5.2. of this rule) or to reduce the design storm requirements (subparagraph 7.1.1.b. of this rule) based upon failure of the dam by overtopping. The applicant must include appropriate calculations to support the request for hazard classification or design storm requirement reduction. The director will not consider risk assessment based upon planned evacuation, probability of inhabitation, or monetary recovery of property damage. If both subparagraph 3.5.4.a. (Dwellings or other Buildings Affected Downstream) and subparagraph 3.5.4.b. (Highways Affected Downstream) pertain to the downstream area, then the hazard classification representing the greatest risk category and the largest of the design storm requirements resulting from the above calculations shall apply. Approval of hazard classification reduction or reduction of design storm requirements based upon risk assessment is vested in the director, and will be based on engineering evaluation of the dam(s) and downstream areas in question.

3.5.4.a. Dwellings or Other Buildings Affected Downstream - The director may consider reduced design storm requirements (subparagraph 7.1.1.b. of this rule) within the approved hazard classification, if the applicant can demonstrate that all affected dwellings, commercial and industrial buildings or important public utilities will be inundated and evacuated prior to the dam failure. The applicant must also demonstrate that the potential for loss of human life resulting from the dam failure is not significantly increased from that which occurs immediately prior to the dam failure.

3.5.4.b. Highways Affected Downstream - The director may consider reduced hazard classification (paragraph 3.5.2. of this rule) and reduced design storm requirements (subparagraph 7.1.1.b. of this rule), if the applicant can demonstrate that affected highway(s) will be impassable and traffic will be stopped in the dam failure inundation area due to the highway(s) being flooded by high water prior to the dam failure. The applicant must also demonstrate that the potential for loss of human life resulting from the dam failure is not significantly increased from that which occurs immediately prior to the dam failure.

**§ 47-34-4. Certificates of Approval.**

4.1. Certificate Required - A person must obtain a certificate of approval from the director in order to place, construct, enlarge, alter, breach, remove, abandon, or perform major repairs upon any dam in this State that falls within the definition set forth in ~~Section 2.6~~ subsection 2.10 of this rule.

4.2. Certificate Issuance.

4.2.1. Certificates of approval may constitute full and final approval of a dam or be issued for alterations or repairs, in which case the certificate may or may not constitute final approval of the dam.

4.2.2. The director will issue or refuse to issue a certificate of approval based upon the following:

4.2.2.a. The receipt of a complete application, including all applicable fees, in accordance with the provisions of ~~Section~~ subsection 5.1 of this rule;

4.2.2.b. The review of the application form and plan package for sufficiency; and

4.2.2.c. The results of any hearings held in accordance with the provisions of W. Va. Code § ~~20-5B-7~~ 22-14-7.

4.2.3. The director will return defective applications to the applicant by certified or registered mail, return receipt requested, in order that the applicant may correct any defect. The applicant must send a corrected application to the director within thirty (30) days of the date of the applicant's receipt of the returned application. The director may extend the thirty-day period upon the receipt of a written request from the applicant.

4.2.4. Upon the receipt of written approval from the director of the sufficiency of the application, the applicant shall immediately publish a Class I legal advertisement in a qualified newspaper, as defined in W. Va. Code § 59-3-1, serving the county in which the proposed dam is to be located or in which the existing dam is located. The notice shall include the name and address of the applicant, the location of the dam for which the application was filed, and such other information as may be specified by the director in his or her written approval.

4.3. Hearings Prior to Certificate Issuance - Any person, as defined in W. Va. Code § ~~20-5B-3~~ 22-14-3, whose ~~life or property~~ may be adversely affected by the issuance of a certificate of approval shall have a right to a hearing before the director. A written request for a public hearing, detailing the specific objections to the issuance of the certificate of approval, must be sent to the director within fifteen (15) days of the publication of the Class I legal advertisement required under ~~Section~~ paragraph 4.2.4 of this rule. Hearings that concern specific objections to the issuance of a certificate of approval will be conducted in accordance with the provisions of W. Va. Code § ~~20-5B-7~~ 22-14-7 at a location and time set by the director.

4.4. Certificate Revocation or Suspension - The director may revoke or suspend a certificate of approval in accordance with the provisions of W. Va. Code § ~~20-5B-8~~ 22-14-8 if he or she determines that a dam for which the certificate was issued constitutes a danger to life and property.

4.5. Certificate Terms and Conditions - A certificate of approval may include such terms and conditions as the director may find necessary for the construction or operation of the dam. These terms and conditions may be amended by the director in accordance with the provisions of W. Va. Code § ~~20-5B-8~~ 22-14-8.

4.6. Approval to Impound Water - No person may cause a reservoir to initially fill with water, or refill a drained reservoir, without written approval from the director.

4.6.1. Upon the receipt of a written petition from a dam owner, the director may waive or modify the refilling approval requirement of ~~Section~~ subsection 4.6 of this rule in a case where frequent draining and refilling of a reservoir is the intended purpose and normal operation of the owner's dam.

4.7. Other Approvals - The director may refuse to issue a certificate of approval or may delay issuing a certificate of approval if the applicant fails to obtain necessary approvals from State or federal agencies.

4.7.1. Waterways Under State or Federal Jurisdiction - Construction of a dam across a waterway which is under the jurisdiction of the State or federal government may require State or federal agency approval prior to issuance of a certificate of approval by the director.

4.7.2. Wetlands - Construction of a dam which may inundate, drain, or otherwise adversely affect wetlands (i.e., swamps, marshes, bogs, and similar areas) may require State and federal agency approval.

**§ 47-34-5. Application Procedures.**

5.1. Application Preparation and Submission.

5.1.1. Applications for a certificate of approval shall be prepared by or under the direct supervision of an engineer.

5.1.2. Applications shall be submitted on the forms provided by the director. Application forms must be completed in their entirety without unauthorized omissions, alterations, or additions. Applications shall be signed by the applicant and an engineer.

5.1.3. A complete application will consist of a completed and signed application form, all applicable fees, and a plan package containing the information required under ~~Section~~ subsection 6.4 of this rule.

5.1.4. Plans, reports, specifications, and design drawings shall be signed and sealed by an engineer in accordance with the provisions of ~~Section~~ subsection 6.2 of this rule.

5.2. Application Review.

5.2.1. Applications will be reviewed for sufficiency by the Dam Safety ~~Office~~ Section. The review will consider the completeness and technical accuracy of the information submitted and will evaluate all engineering plans and assumptions to determine the safety of the dam.

5.2.2. Applications which are incomplete or otherwise not in compliance with the requirements of this rule will be returned to the applicant for correction in accordance with the provisions of W. Va. Code § ~~20-5D-7~~ 22-14-7.

**§ 47-34-6. Plans and Specifications.**

6.1. Plans and Specifications - Plans and specifications relating to the design, placement, construction, enlargement, alteration, removal, abandonment, or repair of a dam must be prepared in accordance with the requirements of Sections 7 through 12 of this rule.

6.2. Engineer's Signature and Seal Required - All plans and specifications shall be signed and sealed by an engineer. The engineer's signature and seal are required on each full-size plan sheet, even if the sheets are bound together, and are further required on the front page of any engineering report book and each unbound sheet of drawings or specifications included in appendices or pockets.

6.3. Engineering Practices - All plans and specifications for the placement, construction, enlargement, alteration, breaching, removal, abandonment, or repair of a dam shall be in the charge of an engineer.

6.3.1. Standard Practices - All engineering designs, procedures, processes, and analyses shall be based upon standard, accepted, and sound engineering practices. Practices which are questionable or difficult to prove analytically may be rejected by the director or returned for additional information.

6.3.2. Experimental Practices - Experimental design will not be approved by the director unless the experiment meets the following conditions:

6.3.2.a. Engineering analysis indicates the design is realistic and success is likely;

6.3.2.b. Failure of the experiment to perform properly will not endanger life and property or cause the failure of the dam; and

6.3.2.c. The engineer and dam owner agree to redesign and modify the experimental design if it does not perform properly.

6.4. Plan Package Organization - Each plan package submitted for approval shall contain the following information, arranged in the following order, unless an alternative submission format is approved by the director:

6.4.1. Project Narrative - A general narrative discussion of the project shall be included in the plan package to detail the following:

6.4.1.a. Existing site conditions;

6.4.1.b. Local geology and geotechnical considerations;

6.4.1.c. Design life of the dam and its appurtenances;

6.4.1.d. Subsidence potential;

6.4.1.e. Design techniques with associated design computations and data;

6.4.1.f. Environmental protection measures for the control of erosion and sedimentation and for the disposal of construction wastes;

6.4.1.g. Method of construction, including clearing and grubbing, topsoil stockpiles, and surface and subsurface drainage structures;

6.4.1.h. Phases or sequence of construction; and

6.4.1.i. Routine inspection and maintenance procedures and schedules.

6.4.2. Construction Sequence and Schedule - A proposed or recommended sequence of construction, with a schedule listing the anticipated number of working days necessary to accomplish each item in the sequence, shall be included in the plan package. The construction sequence and schedule must be specific to the dam and must ~~to~~ cover the following general categories:

6.4.2.a. Sediment control measures;

6.4.2.b. Clearing and grubbing;

6.4.2.c. Road or utility relocations;

6.4.2.d. Development of borrow areas;

6.4.2.e. Placement of coffer dams or diversions;

6.4.2.f. Excavation of foundation areas;

6.4.2.g. Excavation of spillways;

6.4.2.h. Placement of embankment or structural materials;

6.4.2.i. Placement of spillways and appurtenances to spillways;

6.4.2.j. Seeding and mulching of the project area;

6.4.2.k. General cleanup of the project area; and

6.4.2.l. Other information as requested by the director.

6.4.3. Project Specifications - Specifications submitted with the plan package must be specific to construction of the dam or must contain a specific section concerning construction of the dam. Inclusion of specifications for the dam throughout other general construction specifications is not acceptable. Specifications shall be included in the plan package to detail the following:

6.4.3.a. Clearing and grubbing;

6.4.3.b. Soil stockpiles;

6.4.3.c. Subdrain construction;

6.4.3.d. Slopes;

6.4.3.e. Grades;

6.4.3.f. Surface drainage structures such as embankment diversion ditches;

6.4.3.g. Spreading and compaction requirements, including lift thicknesses, moisture content, and degree of compaction;

6.4.3.h. Material and gradation requirements for subsurface drainage structures;

6.4.3.i. Pipes;

6.4.3.j. Concrete, including testing and curing;

6.4.3.k. Anti-seep mechanisms;

6.4.3.l. Cutoff trenches including specific treatment of joints, bedding planes, fractures, weak zones, overhangs or faults;

6.4.3.m. Channel and slope protection (e.g., riprap);

6.4.3.n. Project quality control and testing;

6.4.3.o. Blasting;

6.4.3.p. Construction erosion and sediment control;

6.4.3.q. Construction waste disposal;

6.4.3.r. Dust abatement;

6.4.3.s. Revegetation;

6.4.3.t. Installation and reading of monitoring devices;

6.4.3.u. Inspection and maintenance; and

6.4.3.v. Other information as requested by the director.

6.4.4. Maps and Drawings.

6.4.4.a. Maps shall be included in the plan package showing the project area in relation to primary highways, county seats, and major drainages. County highway maps may be used for this purpose.

6.4.4.b. A map showing the limits of the watershed with

respect to the project area shall be included in the plan package. The minimum map scale meeting this requirement is a 7-1/2 minute United States Geological Survey topographic map with the project area plotted on it.

6.4.4.c. A plan view map of the project area that shows all disturbed and reservoir areas shall be included in the plan package showing detailed contour intervals (i.e., a five-foot maximum interval).

6.4.4.c.A. The location of the following items, if present, shall be plotted on the plan view map:

6.4.4.c.A.(a) Caves;

6.4.4.c.A.(b) Cemeteries and graves;

6.4.4.c.A.(c) Seeps;

6.4.4.c.A.(d) Springs;

6.4.4.c.A.(e) Mine drainage;

6.4.4.c.A.(f) Underground mine openings;

6.4.4.c.A.(g) Underground mine workings;

6.4.4.c.A.(h) Borings and test pits;

6.4.4.c.A.(i) Cross-sections;

6.4.4.c.A.(j) Project stationing;

6.4.4.c.A.(k) Reference points;

6.4.4.c.A.(l) Instrumentation;

6.4.4.c.A.(m) The subdrain system;

6.4.4.c.A.(n) Diversion channels;

6.4.4.c.A.(o) Surface water drainage channels;

6.4.4.c.A.(p) Spillway channels;

6.4.4.c.A.(q) Borrow source areas; and

6.4.4.c.A.(r) Proposed waste disposal areas.

6.4.4.c.B. Additional detailed plan views of the dam or its spillways and appurtenances may be required by the director.

6.4.4.d. Transverse and longitudinal cross-sections and profiles of the dam shall be included in the plan package showing original ground, subdrain locations, elevations, benches, spillways, and other pertinent features of the project area. A cross-section shall be provided for stability computations showing the dam at critical areas, with subsurface data plotted in accordance with the provisions of ~~Section 7.4.2.a.C.(d)~~ subpart 7.4.2.a.D.(d) of this rule.

6.4.4.e. Cross-sections and profiles of major drainage facilities shall be included in the plan package.

6.4.4.f. Construction drawings shall be included in the plan

package showing subdrains, spillways, anti-seep mechanisms, and other pertinent structures.

6.4.5. Inventory of Protected Sites.

6.4.5.a. An inventory of sites protected under State or federal law must be conducted by each applicant seeking a certificate of approval to:

6.4.5.a.A. Construct a new dam; or

6.4.5.a.B. Alter or enlarge an existing dam whereby new areas will be disturbed or flooded.

6.4.5.b. The minimum acceptable protected sites inventory shall include the following components:

6.4.5.b.A. A field survey shall be conducted by the applicant or his or her agents to ascertain the presence of any cave (i.e., a naturally occurring underground subterranean cavity such as a cavern or grotto) within the area to be disturbed or flooded by the project. The location of all caves must then be plotted on the plan view map required under ~~Section~~ subparagraph 6.4.4.c of this rule. If no caves are present in the area to be disturbed or flooded, that fact must be noted in a statement attached to the plan view map submitted to the director.

6.4.5.b.B. A field survey shall be conducted by the applicant or his or her agents to ascertain the presence of any cemetery or grave within the area to be disturbed or flooded by the project. The location of all cemeteries and graves must then be plotted on the plan view map required under ~~Section~~ subparagraph 6.4.4.c of this rule. If no cemeteries or graves are present in the area to be disturbed or flooded, that fact must be noted in a statement attached to the plan view map submitted to the director.

6.4.5.b.C. A copy of the plan view map required under ~~Section~~ subparagraph 6.4.4.c of this rule shall be sent by the applicant to the West Virginia Division of Natural Resources, Nongame Wildlife Program, P.O. Box 67, Elkins, West Virginia 26241. A letter of transmittal that briefly explains the nature of the applicant's project must accompany the map so that State officials may have the opportunity to assess whether the applicant's project will adversely impact any animal or plant species that is listed by the federal government as endangered or threatened in ~~50 C.F.R. Part 17~~ Endangered Species Act. [1987 Stat. 884, as amended: 16 U.S.C. 1531 et seq.]. A copy of the applicant's letter of transmittal must be included in the plan package submitted to the director; and

6.4.5.b.D. A copy of the plan view map required under ~~Section~~ subparagraph 6.4.4.c of this rule shall be sent by the applicant to the West Virginia Division of Culture and History, Historic Preservation Unit, Building 9, State Capitol Complex, 1900 Kanawha Boulevard, Charleston, West Virginia 25305. A letter of transmittal that briefly explains the nature of the applicant's project must accompany the map so that State officials may have the opportunity to assess whether the applicant's project will adversely impact any historic site that is listed by the West Virginia Division of Culture and History on the State Register of Historic Places. A copy of the applicant's letter of transmittal must be included in the plan package submitted to the director.

6.4.5.c. If either artifacts of historical significance or human remains are uncovered by construction or related activities, the Dam Safety ~~Office~~ Section must be contacted immediately. The director may suspend activities in the vicinity of such artifacts or remains until appropriate investigations have been conducted.

6.4.6. Erosion and Sediment Control - The plan package must include either:

6.4.6.a. A copy of the applicant's letter transmitting a permit application for the WV/NPDES Storm Water Construction General Permit to the Program Management/Technical Support Section, 1201 Greenbrier Street, Charleston, WV 25311, if the disturbed area within the site will exceed limits necessary for a NDPES permit, or;

6.4.6.b. An erosion and sediment control plan as required in paragraph 7.5.1. of this rule, if the disturbed area within the site is less than the limits necessary for a NPDES permit.

**§ 47-34-7. Design Requirements.**

7.1. Hydrologic Considerations.

7.1.1. General Hydrologic Requirements.

7.1.1.a. Hydrologic Investigation.

7.1.1.a.A. A survey shall be conducted to evaluate soil types, land use, land slope, watershed area, runoff curve number, and any other factors needed to establish watershed characteristics. A summary of all hydrologic and hydraulic data compiled in the initial site investigation and used in the analysis shall be included in table or figure form in the plan package.

7.1.1.a.B. A stream flow analysis shall be conducted to evaluate stream flow quantity and quality as it affects the dam and its appurtenances.

7.1.1.b. Design Storm Requirements - The design storm and any incremental reduction of the design storm proposed by the applicant is subject to approval by the director. All dams shall be designed to meet the following minimum hydrologic criteria based upon hazard classification:

~~7.1.1.b.A. Class A Dams - Class A dams shall be designed for a minimum P100 storm of six (6) hours in duration.~~

~~7.1.1.b.B. Class B Dams - Class B dams shall be designed for a minimum P100 storm to one-half probable maximum precipitation storm of six (6) hours duration. The magnitude of storm must closely relate to the degree of anticipated damage downstream based upon information supplied to the Director.~~

~~7.1.1.b.C. Class C Dams - Class C dams shall be designed for the probable maximum precipitation of six (6) hours in duration.~~

7.1.1.b.A. Class 1 Dams - Class 1 dams shall be designed for the probable maximum precipitation of six (6) hours in duration. The design precipitation for a Class 1 dam may be reduced based on Risk Assessment (paragraph 3.5.4 of this rule), but in no case to less than seventy percent (70%) of the probable maximum precipitation.

7.1.1.b.B. Class 2 Dams - Class 2 dams shall be designed for fifty percent (50%) of a probable maximum precipitation of six (6) hours duration. The design precipitation for a Class 2 dam may be reduced based on Risk Assessment (paragraph 3.5.4 of this rule), but in no case to less than twenty-five percent (25%) of the probable maximum precipitation.

7.1.1.b.C. Class 3 Dams - Class 3 dams shall be designed

for twenty-five percent (25%) of a probable maximum precipitation of six (6) hours in duration.

7.1.1.b.D. Class 4 Dams - Class 4 dams shall be designed for a P100 rainfall of six (6) hours in duration.

7.1.1.c. Antecedent Moisture Conditions - Where applicable to the development of a hydrograph, Antecedent Moisture Condition II (AMC II) may be used unless a different condition class is required by the director.

7.1.1.d. Flood Routings - An analysis shall be performed for the reservoir and spillways which includes inflow hydrographs, stage storage curves, stage discharge curves, and routings. The spillways must be able to safely discharge that portion of the design storm that is not stored in the reservoir. If a computer analysis is used, the input data and output results must be clearly labeled and identified. Trial calculations or intermediate results not relevant to the final results may be omitted from the plan package.

7.1.2. Specific Hydrologic Requirements.

7.1.2.a. Embankment Dams.

7.1.2.a.A. Storage and Discharge.

7.1.2.a.A.(a) ~~Class A~~ Class 3 dams must be designed with either an open channel spillway only or a combination of principal and emergency spillways. A ~~Class A~~ Class 3 dam shall be capable of passing that portion of the design storm that cannot be safely stored in the impoundment. The design of a ~~Class A~~ Class 3 dam must assure that ninety percent (90%) of the stored volume of the design storm will be discharged within ten (10) days after the storm event.

7.1.2.a.A.(b) ~~Class B~~ Class 2 dams must be designed with either an open channel spillway only or a combination of principal and emergency spillways. A ~~Class B~~ Class 2 dam shall be capable of passing that portion of the design storm that cannot be safely stored in the impoundment. The design of a ~~Class B~~ Class 2 dam must assure that ninety percent (90%) of the stored volume of the design storm will be discharged within ten (10) days after the storm event.

7.1.2.a.A.(c) ~~Class C~~ Class 1 dams designed with either an open channel spillway only or with an emergency spillway and a principal spillway together must be capable of discharging that portion of the ~~probable maximum precipitation~~ design storm that cannot be safely stored in the impoundment. ~~Class C~~ Class 1 dams designed with a decant or principal spillway only must be capable of storing the volume of water generated by a PMP rainfall event of six (6) hours in duration. The design of a ~~Class C~~ Class 1 dam must assure that ninety percent (90%) of the stored volume of the design storm will be discharged within ten (10) days after the storm event.

7.1.2.a.B. Surface Drainage Control - Surface drainage control devices (e.g., vegetated slopes, benches, groin ditches, and collection channels) shall be provided as necessary to protect the dam and its appurtenances from the effects of erosion. Riprap or other erosion protection measures shall be included where excessive velocity is anticipated or experienced. All surface drainage control devices must be designed to exit safely beyond the downstream toe of an embankment in a natural drainway capable of carrying the design flow without excessive erosion. The 50-year, 6-hour rainfall event shall be used as the design storm for surface drainage systems.

7.1.2.a.C. Spillway Frequency of Operation - Outlet works that incorporate vegetated earth or unlined earth emergency spillways shall

be designed so that the average frequency of operation is no greater than the following recurrence schedule, based upon a 6-hour rainfall event:

7.1.2.a.C.(a) ~~Class A~~ Class 3 and Class 4 Dams - Once in twenty-five (25) years.

7.1.2.a.C.(b) ~~Class B~~ Class 2 Dams - Once in fifty (50) years.

7.1.2.a.C.(c) ~~Class C~~ Class 1 Dams - Once in one hundred (100) years.

7.1.2.a.D. Overtopping Embankments - Regardless of their hazard classification, dams designed to overtop in accordance with the provisions of ~~Section 7.4.2.a.D~~ part 7.4.2.a.E of this rule shall not overtop more frequently than once in one hundred (100) years, based upon a 6-hour rainfall event.

7.1.2.b. Gravity Dams - Gravity dams may be designed in the same manner as the corresponding hazard classes of embankment type dams in ~~Section~~ part 7.1.2.a.A of this rule except that designed overtopping of the dam may be substituted for the emergency spillway requirements.

7.1.2.c. Waste Disposal Dams.

7.1.2.c.A. Storage and Discharge - The following storage and discharge systems may be used in design of waste disposal dams:

7.1.2.c.A.(a) Open Channel Only or Emergency Spillway with Principal Spillway - A dam designed with either an open channel spillway only or with an emergency spillway and a principal spillway together shall be capable of discharging that portion of the design storm that cannot be safely stored in the impoundment. This type of design must assure that ninety percent (90%) of the stored volume of the design storm will be discharged within ten (10) days after the storm event. Slurry impoundments shall be provided with a means of removing water to maintain the lowest practical water level.

7.1.2.c.A.(b) Principal Spillway or Decant Only - A dam designed with a decant or principal spillway only shall be capable of storing the volume equivalent to a minimum of one (1) design storm. Risk assessment shall not be applied to dams with principal spillway or decant only. This type of design must assure that ninety percent (90%) of the stored volume of the design storm will be discharged within ten (10) days after the storm event. Slurry impoundments shall be provided with a means of removing water to maintain the lowest practical water level.

7.1.2.c.A.(c) No Outlet Works - A dam designed without discharge structures shall be capable of storing the volume equal to a minimum of two (2) design storms. Risk assessment shall not be applied to dams with no outlet works. Water shall be removed from the impoundment to its lowest practical level by pumping or other means if storm water reduces the storage capacity to one (1) design storm or less.

7.2. Hydraulic Considerations.

7.2.1. General Hydraulic Requirements.

7.2.1.a. Hydraulic Analysis - Using standard engineering practices, a hydraulic analysis shall be performed for the spillways and surface drainage system. Typical cross-section design techniques may be used where constant slopes are encountered. All hydraulic structures shall be designed to safely control the velocity of water in order to prevent excessive erosion.

of groundwater location. Results of in-situ testing and soil sampling shall be reported in the plan package. Soil profiles shall be utilized for critical foundation locations of the structure, spillways, and other pertinent locations which affect the safety of the structure. A geological study shall also be conducted to evaluate stratigraphy, landslides, bedrock discontinuities such as soft seams, joints, joint systems, bedding planes, and fault zones which may adversely affect the structure's performance. Past and future mining including thickness of coal seams, depth and type of rock above the coal seam, and previous or expected subsidence problems shall be considered where subsidence may affect the safety of the structure.

7.3.1.a. Project Area Survey - A project area survey shall be conducted to establish baselines and elevations of the dam embankments, reservoir and borrow areas, and appurtenant structures. The survey shall locate all test pits, borings, gas wells, oil wells, water wells, mine openings, landslides, and areas of natural seepage.

7.3.1.b. Borrow Areas - Borrow areas shall be evaluated for appropriate construction materials and required volume. Borrow areas and excavation materials shall be tested to determine the suitability of material for use in embankments or drains.

7.3.2. Laboratory Testing - Laboratory tests shall be conducted on a sufficient number of samples of foundation and embankment materials to provide an accurate representation of soil conditions. Tests shall include, but not be limited to, a complete soil classification including grain size, sieve, hydrometer analysis, Atterberg limits, density, water content, compaction tests, shear strength, consolidation, and permeability where applicable. Compaction and proctor curves shall be developed for all fill materials as appropriate.

7.3.3. Geotechnical Evaluation - A summary of all geotechnical data determined in the initial site geotechnical investigation and used in the analysis shall be included in table or figure form in the plan package.

7.3.3.a. Seepage Analysis - An analysis of seepage and its detrimental effects on structural integrity shall be made. The analysis shall include consideration of potential piping in the embankment, foundations, and abutments. Seepage control measures shall be specified as necessary in order to enhance the stability of the embankment and adjacent area. Drainage systems shall be designed and constructed using a material approved by the director and shall be protected by a properly designed filter zone using standard geotechnical engineering design practices. The design shall specify methods for sealing or controlling seepage encountered in foundation zones during construction.

7.3.3.a.A. Foundation Treatment - If analysis indicates a highly fractured foundation, the engineer shall specify necessary treatment of the foundation zone including, but not limited to, foundation grout curtains, dental concrete treatment of fractures or overhangs, and detailed methods of foundation zone cleaning. Material used in grouts shall be specified in accordance with the provisions of ~~Section~~ part 7.4.1.a.B of this rule.

7.3.3.b. Foundation Stability - The foundation must be designed to have adequate bearing capacity to support the embankment and any appurtenant works. Potential subsidence and settlement and their consequences shall be considered using standard engineering practices. Special attention shall be given to differential settlement which would lead to cracking of the dam. Spillway pipes on compressible foundations shall be protected from damage due to settlement.

7.3.3.c. Landslides - The potential for landslides, as determined in the initial project area investigation, shall be evaluated by the engineer. If landslides noted in the project area could cause instability of the

dam or appurtenant structures, blockage of spillways and other critical drainage structures, or overtopping of the dam by displacement of water in the reservoir area, such conditions shall be corrected to a minimum static safety factor of 1.5.

7.4. Structural Considerations.

7.4.1. General Structural Requirements - All structures shall be designed to perform as intended for the design life of the dam with proper maintenance or replacement.

7.4.1.a. Structural Materials - Materials selected for use in the dam shall be of adequate quality and durability for the intended purpose of the structure. All structures shall be designed to have sufficient strength plus an adequate safety factor against failure during maximum anticipated loading conditions.

7.4.1.a.A. Earth Materials - Earth materials selected for use in dam construction shall be free from roots, brush, organic materials, construction waste, and other debris. Where rock or rock fill is specified, the rock shall be durable and not subject to slaking or breakdown. Size gradations of the earth materials shall be specified to perform as planned. Compaction requirements for earth materials shall be specified in the plan package.

7.4.1.a.B. Concrete Design - Concrete shall be designed in accordance with standard engineering practices. Concrete design specifications shall include materials, proportioning, form-work, reinforcement, joints and embedded items, production, placing, repair of surface defects, finishing, curing and protection, testing, evaluation and acceptance, and allowable tolerances for acceptance.

7.4.1.a.B.(a) Concrete Specifications - The engineer shall specify the nature of concrete to be used with sufficient detail for on-site quality control. The concrete may be specified by specific mix, aggregate, water content, additives, compressive strength, slump, and air entrainment or by reference to specific standards of concrete quality. If published standard specifications are referenced, a copy of the standard or pertinent sections of the standard shall be included in the plan package.

7.4.1.a.B.(b) Concrete Placement - The engineer shall specify methods and limits of placement of the concrete including foundation preparation, maximum lift height, maximum time allowed between mixing and placement, methods of working into forms and corners, methods of consolidation and use of vibrating devices, and allowable ambient air temperatures and concrete temperatures.

7.4.1.a.B.(c) Concrete Curing - The engineer shall specify the method of curing the concrete including moist curing or membrane curing, wetting, types of covering, acceptable curing temperature range of the concrete, any anticipated cold weather curing specifications or methods such as protection from freezing and insulation methods, hot weather placement methods and limitations, and curing time.

7.4.1.a.B.(d) Concrete Finishing - The engineer shall specify the type of finishing to be applied to the concrete and the acceptable temperature range.

7.4.2. Specific Structural Requirements.

7.4.2.a. Embankment Dams.

7.4.2.a.A. Selection of Materials - Material selected

for construction of embankments shall be select earth material that is free from roots, brush, organic matter, construction waste, and other debris. The material must not be subject to breakdown or chemical reaction. Unless otherwise approved by the director, the selected material must be thoroughly tested for density, shear strength, liquid and plastic limits, and optimum moisture content. The source of the material and available quantities shall be identified and adequate sampling performed in order to attain consistent quality and soil characteristics.

7.4.2.a.B. Seepage and Piping Control - The director may require installation of a properly designed filter drain system to prevent embankment failure due to seepage and/or internal erosion on any dam which can cause loss of human life or major damage to dwellings, or commercial or industrial buildings, important public utilities, or where a high risk highway may be affected.

~~7-4-2-a-B-~~ 7.4.2.a.C. Zoned Embankments.

~~7-4-2-a-B-(a)~~ 7.4.2.a.C.(a) Filter Drains - Filter drains shall be used in embankment zones where necessary to intercept seepage, reduce phreatic level, and reduce potential for internal erosion. Drain outlets shall be visible, not submerged under normal conditions, unobstructed, and protected with an animal guard where conduits are utilized.

~~7-4-2-a-B-(a)(A)~~ 7.4.2.a.C.(a)(A) Gradations - The gradations of the filter material shall be sized to prevent or resist the migration of embankment material into the voids of the filter. The filter shall be permeable relative to the surrounding embankment material.

~~7-4-2-a-B-(a)(B)~~ 7.4.2.a.C.(a)(B) Size - The filter drain shall be capable of passing the maximum anticipated seepage flows without excessive pore pressure. The combination of filter permeability and area shall be considered in sizing the drain.

~~7-4-2-a-B-(a)(C)~~ 7.4.2.a.C.(a)(C) Durability - The material used in the filter shall be hard, durable material that is not subject to slaking, breakdown, or chemical reaction.

~~7-4-2-a-B-(a)(D)~~ 7.4.2.a.C.(a)(D) Conduits - Perforated pipes may be used in the filter drain to increase capacity. Perforations shall be compatible with the filter gradations so that filter material will not enter the pipe. The pipe shall be capable of supporting the fill load and shall be of a material which will last for the design life of the structure. Corrugated metal pipe shall not be used in critical areas of the embankment or in any areas where the pipe is not reasonably accessible for replacement.

~~7-4-2-a-B-(a)(E)~~ 7.4.2.a.C.(a)(E) Filter Cloth - Filter cloth shall not be used in critical areas of the embankment or in any areas where the cloth is not reasonably accessible for replacement.

~~7-4-2-a-B-(b)~~ 7.4.2.a.C.(b) Diaphragm Cutoff Walls - When concrete cutoff walls are used as an impermeable barrier, the concrete wall shall be placed upon an adequate foundation and be constructed of reinforced concrete. Where pipes pass through the concrete wall, adequate support for the pipe shall be provided to prevent differential settlement and pipe shearing.

~~7-4-2-a-C-~~ 7.4.2.a.D. Embankment Stability -The following stability requirements apply to Class 1 through Class 3 dams. The director may approve lower safety factors for Class 4 dams, based on engineering recommendations.

~~7.4.2.a.C.(a)~~ 7.4.2.a.D.(a) Embankment Safety Factors - Slope stability shall be analyzed to show that the embankment design achieves the following factors of safety under the conditions listed. Unless otherwise indicated, factors of safety requirements apply to both upstream and downstream slopes of the embankment:

~~7.4.2.a.C.(a)(A)~~ 7.4.2.a.D.(a)(A) A ~~safety~~ factor of 1.5 for the embankment loading conditions specified in ~~Section 7.4.2.a.C.(c)~~ subpart 7.4.2.a.D.(c) of this rule;

~~7.4.2.a.C.(a)(B)~~ 7.4.2.a.D.(a)(B) An end of construction safety factor of 1.3;

~~7.4.2.a.C.(a)(C)~~ 7.4.2.a.D.(a)(C) A n upstream slope rapid drawdown safety factor of 1.2; and

~~7.4.2.a.C.(a)(D)~~ 7.4.2.a.D.(a)(D) A n earthquake safety factor under steady-state seepage conditions of 1.2 using seismic loading appropriate to the geological site conditions.

~~7.4.2.a.C.(b)~~ 7.4.2.a.D.(b) Appurtenance Structural Stability - Embankments constructed as part of an appurtenant structure where failure will lead to a dangerous condition in the dam shall achieve a static safety factor of 1.5.

~~7.4.2.a.C.(c)~~ 7.4.2.a.D.(c) Embankment Loading Conditions - Loading conditions shall assume a long-term steady-state condition with the phreatic surface originating at the elevation of the emergency spillway crest for embankment dams with emergency spillways or at a maximum design pool elevation for embankment dams without spillways.

~~7.4.2.a.C.(d)~~ 7.4.2.a.D.(d) Stability Analyses - All slope stability analyses shall be performed using standard engineering practices. Exceptions to this requirement will be allowed by the director only where there is sufficient evidence to indicate that slope failures will not occur.

~~7.4.2.a.C.(d)(A)~~ 7.4.2.a.D.(d)(A) Critical cross-sections of the dam using equal X and Y axes scales shall be provided in the plan package. The cross-sections shall show the embankment limits, foundation zones, soil zones, phreatic line, assumed reservoir elevation, stability arcs or failure planes through the dam, and resulting safety factors for each critical arc or failure plane shown.

~~7.4.2.a.C.(d)(B)~~ 7.4.2.a.D.(d)(B) A listing of soil zone unit weights, angles of internal friction, and cohesion values for each soil shown on the cross-section shall be provided in the plan package. If an alternative analysis is utilized, assumed soil values of the analysis shall be shown.

~~7.4.2.a.D.~~ 7.4.2.a.E. Overtopping Embankments.

~~7.4.2.a.D.(a)~~ 7.4.2.a.E.(a) Rock-Covered Embankments - Rock -covered embankments shall be designed so that the rocks selected will be sized to withstand the maximum depth and velocity of the overtopping flow and be individually placed to maximize the interlocking effect. A minimum of two (2) layers of boulders is required. Boulders shall cover the crest, downstream face, and necessary areas of the upstream face of the dam and extend beyond the dam abutments to the extent necessary to contain the overtopping flow depth. Graded smaller rock shall fill the voids where the boulders contact the embankment to prevent erosion due to flow through the voids. The rock cover may be covered with soil and vegetated, provided that the

equipment used to place the soil will not break the rock.

~~7.4.2.a.D.(b)~~ 7.4.2.a.E.(b) Roller-Compacted Concrete Embankments. Roller-compacted concrete lift thickness and width shall be sized to withstand the maximum anticipated loading and uplift forces. Filter drains and weep holes shall be provided to relieve hydrostatic pressure behind roller-compacted concrete facings. The roller-compacted concrete may be covered with soil and vegetated.

7.4.2.b. Gravity Dams. The following stability requirements apply to Class 1 through Class 3 Dams. The director may approve lower safety factors for Class 4 dams, based on engineering recommendations.

7.4.2.b.A. Stability Loading Conditions - Loading conditions for the stability analysis shall assume maximum overflow head from the design storm.

7.4.2.b.B. Gravity Dam Stability.

7.4.2.b.B.(a) Overturning - The reaction of all forces must act within the middle one-third of the base. This requirement may be modified by the director if detailed computations prove that overturning will not occur.

7.4.2.b.B.(b) Sliding - The dam shall have a factor of safety against sliding of at least 3.0 for normal loading conditions and 1.5 for maximum loading conditions. The sliding factor of safety may be reduced to no less than 2.0 for normal loading conditions where intimate knowledge of subsurface conditions has resulted from a state-of-the-art subsurface investigation, testing program and design analysis. The subsurface investigation and testing necessary to reduce the factor of safety should include, but not be limited to: sampling and testing of weak zones such as discontinuities, joints, joint fill material, fracture zones, bedding planes, and faults and; determination of peak, ultimate and residual strengths of foundation materials. Design analyses should include, but not be limited to: three dimensional analyses of foundation strength resulting from the subsurface investigation. The adequacy of subsurface investigations, testing, and design analyses necessary to reduce the factor of safety is subject to approval by the director.

7.4.2.b.B.(c) Bearing - The factor of safety against bearing failure shall be at least 1.5 for maximum stress at the downstream toe.

7.4.2.c. Waste Disposal Dams - The potential for liquefaction must be considered and the design shall include safeguards against the development of this condition.

7.4.2.d. Spillways - All spillways shall be designed to discharge an adequate distance beyond the downstream toe of the dam in a natural drainway to prevent erosion of the downstream toe or other detrimental effects to the dam structure.

7.4.2.d.A. Conduit Spillways - Inlets shall be protected by a designed trash rack and riser type spillways shall be designed to prevent detrimental vortexing. Risers shall have adequate weight to be non-buoyant and shall be of sufficient strength to withstand maximum dynamic water and ice forces. Foundations for risers shall be designed to support the riser without serious movement or deformation.

7.4.2.d.A.(a) Conduits - Pipe conduits shall be placed on a designed foundation and bedding of sufficient strength to minimize

settlement and other detrimental effects to the conduit. Anti-seep or anti-piping mechanisms shall be provided for all conduits passing through the dam, foundation, or abutments to control seepage along the pipe. Design allowances shall be made to compensate for differential settlement, elongation, and movement of the pipe conduit if the cradle is placed on a yielding foundation. Pipe conduits shall be of sufficient strength to support the maximum external loads and the maximum internal hydraulic pressure without leaking, and shall resist uplift pressures. The pipe conduit shall be constructed of material which will not deteriorate during the design life of the structure.

7.4.2.d.A.(a)(A) Use of Corrugated Metal Pipes -Corrugated metal pipes, whether coated or uncoated, shall not be used in new ~~class B~~ Class 2 or new ~~class C~~ Class 1 dams. Corrugated metal pipes in existing dams must be either replaced with new pipe or retrofitted with an appropriate liner if the director determines that the existing pipe constitutes a hazard to the proper operation of the dam because the pipe has developed leaks, has deteriorated, or has otherwise ceased to function properly.

7.4.2.d.A.(b) Outlets - Pipe conduits shall be designed to outlet in a natural drainway or a designed channel leading to a natural drainway. An energy dissipator shall be provided to eliminate erosion at the pipe outlet and be designed for maximum pipe flow. If pipe blockage by animals may occur, the pipe outlet shall be protected by an animal guard.

7.4.2.d.A.(c) Gated Drain Pipe Required for New Freshwater Dams - All new freshwater dams shall have a gated drainpipe for draining the impoundment. The gate or valve shall be located in the reservoir or in the saturated zone upstream of the cutoff wall or impermeable ~~zone~~ barrier. If the gate is located within the embankment or structure, a service well shall be provided. The elevation of the gate system shall be such that the reservoir will be drained completely to original stream level. The drain system shall be designed to drain ninety percent (90%) of the volume of stored water at normal pool in ten (10) days including normal base flow and have a minimum capacity of three (3) times the normal base flow for the watershed with a headwater-to-diameter (HW/D) ratio of 1.5, unless otherwise approved by the director. The drain conduit shall meet the requirements for conduits set forth in ~~Section~~ subpart 7.4.2.d.A.(a) of this rule. A designed trash rack shall be provided at the inlet of the drain. The controls to operate the drain gate shall be accessible without the use of specialized equipment or of divers. The drawdown rate for reservoir storage volumes in excess of two thousand (2000) acre-feet may be established by the director.

7.4.2.d.A.(d) Existing Dams with Gated Drain Pipes - All existing dams currently equipped with a gated drain pipe must meet the design requirements of subpart 7.4.2.d.A.(c) of this rule and continue to be operated and maintained with the gated drain pipe. If such a gate or valve was not previously installed, a gate or valve shall be installed in the reservoir or in the saturated zone upstream of the cutoff wall or impermeable barrier. The director may approve reduced drawdown time and flow quantity requirements for existing drains. Drain systems not meeting the design requirements of subpart 7.4.2.d.A.(c) of this rule or dams with leaking or inoperative drain systems must be repaired or modified to maintain the greatest practical capacity of the drain system. If installation of the upstream gate or valve is impractical without draining of the reservoir and reservoir drainage will cause major economic loss to the owner, the director may approve delay of the upstream gate or valve installation until the next necessary draining of the reservoir, provided that the existing drain system is functioning properly and is not leaking in a manner that would create a serious problem. If the existing drain system develops a serious problem, the director may order immediate remedial action. The director may grant an exemption to this subpart when investigation of the existing drain system determines to the director's satisfaction that installation of an upstream drain gate or valve is not feasible.

~~7.4.2.d.A.(d)~~ 7.4.2.d.A.(e) The term "gate" or "valve" as used in this rule is a general term referring to a device used for controlling water flow.

7.4.2.d.B. Open Spillways - Unless specifically excluded, spillways of this type include the various designs of open type spillways including open channel, side channel, chute, labyrinth, and ogee.

7.4.2.d.B.(a) Earth Spillways - Spillways that are constructed of or in earth material shall be designed to pass the maximum design flow without excessive erosion. Earth spillways shall not be constructed over dam embankment fill material.

7.4.2.d.B.(a)(A) Flexible Linings - Vegetation, rock riprap, soil reinforcement, or other flexible linings may be used to increase flow quantities and velocities in earth spillways within design limits.

7.4.2.d.B.(b) Concrete Spillways.

7.4.2.d.B.(b)(A) Concrete - The engineer shall specify the grade and strength of concrete to be used in the spillway construction. The concrete structure shall be of sufficient strength to withstand the maximum design applied load.

7.4.2.d.B.(b)(B) Foundation - Concrete shall be placed on a prepared foundation and bedding capable of sustaining the applied loads without excessive deformation.

7.4.2.d.B.(b)(C) Drains - Designed filter drains and water pressure relief devices shall be provided under concrete slabs and walls to collect and safely convey water from seepage or leakage of construction joints and to relieve uplift pressure from seepage conditions.

7.4.2.d.B.(b)(D) Joints - Construction joints shall be made watertight by use of a sealant material. Sliding joints shall be supported by a slab to maintain alignment.

7.4.2.d.B.(b)(E) Cutoff Barriers - Cutoff barriers keyed into the foundation shall be provided to prevent or reduce seepage flow under the spillway.

7.4.2.d.B.(b)(F) Energy Dissipators - An energy dissipator shall be provided to reduce the hydraulic energy at the end of the spillway. The dissipator shall be designed to function properly for flows of at least one-half of the design spillway flow. Flows in excess of the design capacity of the energy dissipator shall not endanger the dam or its appurtenances and may result only in erosion.

7.4.2.d.B.(c) Nonstandard Spillway Design - The director may reject any spillway design if such design is of a nonstandard or untested nature and it is not possible to analytically predict the performance of the spillway or the detrimental effects of cross-waves, eddies, vortices, super-elevation, or hydraulic jumps within the spillway system.

7.4.2.e. Water Supply Pipes - Water supply pipes through a dam shall be constructed of a long-life, high-strength material. Welded joints or mechanical joints with sealing rings, or an alternative sealing method approved by the director, shall be utilized. Pipes shall be properly bedded to reduce differential settling or elongation. Anti-seep mechanisms or filter drains shall be provided to prevent piping along the exterior of the pipe. If the pipe is enclosed in or passes through concrete, the relative coefficients of expansion

shall be considered. Anti-corrosive measures shall be employed if soil tests indicate corrosion may be a problem. An upstream shutoff valve shall be installed on all new dams or when upgrading existing dams where reservoirs are to be drained as part of the upgrading. The section of the pipe through the dam shall be capable of withstanding a minimum pressure of twice the maximum reservoir head. The pipe shall be pressure-tested for leaks at maximum reservoir head pressure prior to the final covering of the pipe installation.

7.5. Miscellaneous Considerations.

7.5.1. Erosion and Sediment Control - Erosion and sediment control measures sufficient to comply with the provisions of ~~Section~~ paragraph 8.1.13 of this rule shall be included in the project design where the disturbed area within the site is less than three acres. If the disturbed area within the site exceeds three acres, a letter documenting submission of a NPDES permit application must be submitted in accordance with subparagraph 6.4.6.a. of this rule.

7.5.2. Waste Disposal Areas - The engineer shall delineate locations in the project area which are to be used as waste disposal areas.

7.5.3. Instrumentation - The engineer shall recommend instrumentation as necessary to monitor and measure performance of new dams or modifications to existing dams. The engineer shall specify the types and purpose of the recommended instrumentation.

7.5.3.a. Piezometers or Observation Wells - Piezometers or observation wells may be required by the director on embankment type dams to monitor phreatic level and water pressures in critical areas of the embankment and, if necessary, the foundation or abutments. All piezometer or well heads shall be anchored in concrete and protected from vandalism with a locking metal cylinder surrounding the piezometer or well pipe.

7.5.3.b. Survey Monuments - Survey monuments may be required by the director on embankment and gravity dams to monitor displacement, settlement, rotation, and deformation. Survey monuments on earth dams shall be sufficiently embedded into the structure to prevent localized movement of the monument. Protective casings shall be installed if necessary to prevent damage or forced movement of the survey point.

7.5.4. Staged Construction - Waste disposal dams designed in stages of construction shall be capable of storing or passing the design storm specified in ~~Sections~~ subparagraph 7.1.1.b and part 7.1.2.a.A of this rule during all stages of construction except during the initial start-up period, unless otherwise approved by the director. During the initial start-up period, the dam shall be capable of storing or passing the P100 rainfall event as soon as possible. Construction shall increase storm capacity, reaching the full design storm capacity within two (2) years.

## § 47-34-8. Construction or Modification of a Dam.

8.1. Construction Requirements.

8.1.1. Notification of the Commencement of Construction - Prior to the commencement of construction activities in the project area, the person who has been issued a certificate of approval, or his or her representative, shall notify the director of the following:

8.1.1.a. The intent of the contractor to start construction in the project area and the date of such start-up.

8.1.1.b. The name, address, and telephone number of the owner's authorized contact person at the project area who is responsible for communicating with the Dam Safety ~~office~~ Section and for receiving inspections reports and legal notifications.

8.1.2. Conformance with Plans - All work undertaken in the construction or modification of a dam shall be in strict conformance with the plans and specifications contained in the plan package submitted under ~~Section~~ subsection 5.1 of this rule and approved by the director. Any changes to the approved plans and specifications shall be submitted to and approved by the director prior to implementation.

8.1.3. On-Site Documents - A copy of the certificate of approval, the approved plans and specifications, all outstanding notices to comply or orders to comply that have been issued by the director, and the monitoring and emergency action plans prepared in accordance with the provisions of ~~Sections~~ subsection 15.6 and subsection 15.7 of this rule shall be available at the project area office for reference by construction personnel and the director.

8.1.4. Adverse Weather Conditions - Construction work shall be suspended on all or part of the project when adverse weather conditions (e.g., prolonged precipitation, extreme temperatures) jeopardize the performance of work in conformance with the approved plan package.

8.1.5. Clearing and Grubbing - Clearing and grubbing shall be performed in the foundation, borrow, and soil stockpile areas. Clearing is required in the maximum permanent pool area unless otherwise approved by the director.

8.1.6. Foundation Preparation - Foundation preparation shall include installation of keyways and subdrains, removal of soft areas, and similar project area preparation operations dictated by the approved plans and specifications and by project area conditions. The foundation shall be inspected by the director prior to placement of embankment materials. If foundation problems are discovered during this inspection, additional foundation preparation may be required by the director.

8.1.7. Placement of Materials.

8.1.7.a. All fill shall be placed in accordance with the approved plans and specifications.

8.1.7.b. Compaction testing shall be completed as specified in the approved specifications; the results of such testing shall be reported in accordance with the provisions of ~~Section~~ paragraph 8.4.1 of this rule.

8.1.7.c. Filter drains shall be constructed in accordance with the approved plans and specifications. Filter material shall be tested for compliance with design gradations; the results of such testing shall be reported in accordance with the provisions of ~~Section~~ paragraph 8.4.1 of this rule. Filter materials shall be placed to prevent segregation and contamination and shall be concurrently covered to prevent contamination or damage.

8.1.8. Grading.

8.1.8.a. All fill shall be graded in accordance with the approved plans and specifications.

8.1.8.b. The working surface and outslopes of the fill shall be concurrently graded through all phases of embankment construction.

8.1.8.c. The top of the fill shall be crowned to provide positive drainage during construction.

8.1.8.d. Final grading shall be conducted in order to facilitate revegetation.

8.1.9. Spillways and Appurtenances.

8.1.9.a. Spillways and appurtenances shall be constructed in accordance with the approved plans and specifications.

8.1.9.b. When downslope placement of fill material is used in the construction of spillways, the fill material shall be compacted in horizontal layers to achieve the design configuration.

8.1.9.c. All riprap material shall be of hard, durable rock which is not acid-forming or toxic. Riprap shall be placed to prevent size segregation.

8.1.9.d. When bedding is used under riprap, the rock material shall be placed in a manner so as not to damage or contaminate the bedding.

8.1.9.e. When protective channel linings are specified, the linings shall be installed as soon as the channel is constructed to grade in accordance with the approved plans and specifications.

8.1.9.f. When concrete is used in construction of spillways and appurtenances, the concrete shall be placed, cured, and finished in accordance with the provisions of ~~Sections~~ subpart 7.4.1.a.B.(b) through subpart 7.4.1.a.B.(d) of this rule. Standard engineering tests shall be performed in accordance with the provisions of ~~Section~~ subparagraph 8.2.2.a of this rule and reported in accordance with the provisions of ~~Section~~ paragraph 8.4.1 of this rule.

8.1.9.g. All pipes, risers, and appurtenances shall be installed in accordance with the approved plans and specifications. Compaction testing shall be completed to ascertain that fill material around pipes, risers, and appurtenances has been placed in accordance with the approved plans and specifications; the results of such testing shall be reported in accordance with the provisions of ~~Section~~ paragraph 8.4.1 of this rule. Sufficient fill shall be placed over pipes so as to prevent damage by heavy equipment.

8.1.10. Minimum Stream Flow - An adequate flow of water may be required by the director in the stream below the dam during construction and reservoir filling to maintain water quality in the stream and to support fish and other aquatic life. The director may require stream flow augmentation in accordance with the provisions of ~~Section~~ paragraph 15.3.2 of this rule.

8.1.11. Blasting - Blasting may only be utilized in accordance with and as specified in the approved plans and specifications. Blasting based upon unforeseen project area conditions not covered in the approved plan package shall not be performed prior to approval by the engineer with the concurrence of the director.

8.1.12. Storm Water Discharge - The sequence of construction work shall be planned to maximize the safe discharge of storm water while minimizing the amount of water retained in the impoundment. Either the principal spillway structures, including inlets and outlets, shall be operable prior to placement of construction material above the original valley elevation or diversion channels approved by the director shall be in place.

8.1.13. Erosion and Sediment Control.

8.1.13.a. General Requirements - Erosion and sedimentation must be controlled to prevent a degradation of land and streams below the dam or project area, including visible deposits of sediment, and to prevent any violation of State water quality standards. Erosion and sediment control measures shall, at the minimum, conform with current erosion and sediment control reference manuals and apply to the entire project area.

8.1.13.b. Specific Requirements - Cleared areas, borrow areas, disturbed areas along stream channels and waterways, and fills, whether complete or in progress, must be equipped with erosion and sediment control devices (i.e., diversions, waterways, sediment basins, straw bale dikes, or silt fences).

8.1.13.b.A. Location of Sediment Control Devices - Erosion and sediment control devices must be located as close to the disturbed area as practical. Effort must be made to contain the sediment load within the disturbed area in order to prevent the entry of sediments into the natural drainway or stream.

8.1.13.b.B. Removal of Sediment Control Devices - Erosion and sediment control devices must remain in place until permanent vegetation is established or the area is otherwise stabilized. Prior to the removal of the devices, trapped sediment must be removed and placed in a location approved by the director. Straw bale dikes and silt fences must be removed when no longer needed; sediment basins or ponds must be abandoned in a manner approved by the director. Barren and denuded areas remaining after the removal of a control device must be revegetated.

8.1.13.b.B.(a) The director may modify or waive the requirements of ~~Section~~ part 8.1.13.b.B of this rule for erosion and sediment control devices that are located within the impoundment area of the dam.

8.1.13.b.C. Cleaning Frequency - Sediment control diversions, silt fences, straw bale dikes, and waterways must be inspected once each week, and after each rainfall, and accumulated sediment must be removed in order to maintain design capacity. Sediment ponds, basins, and traps must be restored to design capacity when sediment accumulation approaches sixty percent (60%) of design capacity, or more frequently if so specified by the director in writing.

8.1.13.b.D. Temporary Seeding and Mulching - Temporary seeding and mulching shall be utilized on bare areas where no construction activity is anticipated for a period of three (3) or more weeks. Areas that shall receive seeding and mulching include the reservoir area, borrow areas, soil stock piles, and steep fill slopes where no further work is planned prior to final grading. Where seeding is not feasible due to severe slope or time of year, the director may approve mulching alone at a rate of three (3) tons of straw or hay per acre, or equivalent.

8.1.13.b.E. Water Routing - Water that is pumped or drained from work areas (e.g., excavations, foundations, and below grade fills) must be routed to properly-sized sediment control devices so that any sediment contained in the water is removed prior to discharge of the water from the project area. Pump discharges may not cause erosion or suspension of additional solids. No untreated water may be pumped or drained to the natural stream or stream diversion channel.

8.1.13.b.F. In-Stream Treatment - Barriers, such as silt fences or straw bales, located in the natural drainway or stream will not be considered acceptable as the primary means of sediment control for the project

area. Properly designed sediment basins or ponds may be used for sediment control in the natural drainway or stream if the location of the basin or pond does not cause significant additional disturbance in undisturbed downstream areas. Use of a starter dike or the dam under construction may be considered appropriate for sediment control of the reservoir area provided the necessary detention time is achieved.

8.1.13.b.G. Sediment Control During Construction - Erosion and sediment control measures must be in place prior to the beginning of dam construction activities. Clearing and grubbing or sediment control measures not specified for the beginning of construction must be implemented in a timely manner as needed.

8.1.13.b.H. Permanent Erosion Measures - Permanent measures (e.g., vegetation, grading, diversions, waterways, and outlet structures) shall be included on all completed or existing dams, where applicable, to prevent the erosion of embankments, abutments, stream channels, and waterways during the life and operation of the dam.

8.1.14. Disposal of Construction Wastes.

8.1.14.a. General Disposal Requirements - All waste materials that result from construction activities shall be disposed of in a manner approved by the director.

8.1.14.b. Specific Disposal Requirements.

8.1.14.b.A. Surplus Waste Materials - Surplus soil and rock materials shall be deposited in waste disposal areas delineated in the approved plans.

8.1.14.b.B. Organic Waste Materials - Trees, brush, root masses, and construction-related wood materials may be either buried in waste disposal areas delineated in the approved plan package or burned in accordance with local and State burning ordinances ~~and State air pollution control regulations~~.

8.1.14.b.C. Concrete Waste Materials - New or old waste concrete materials may be disposed of in areas approved by the director for surplus soil and rock materials. New, unset waste concrete shall not be deposited in a location where it will enter watercourses, either directly or indirectly as a result of runoff. After it has set, the new waste concrete may be moved to waste disposal areas delineated in the approved plans.

8.1.14.b.D. Other Waste Materials - Chemicals, petroleum products, plastics, garbage, sewage, and any associated containers shall be disposed of in a manner approved by the director.

8.1.14.b.E. Off-Site Waste Materials - No waste materials or soil waste may be transported to the project area for disposal.

8.1.15. Dust Abatement - The contractor shall fully suppress dust on haul and access roads and as necessary within the project area. Water, or an alternative dust palliative approved by the director, shall be used for dust suppression; the use of oil or waste oil is prohibited.

8.1.16. Access Roads - A permanent access road shall be provided to each dam site. The road must be adequate for emergency vehicular traffic. Single lane unpaved roads are acceptable provided the roads are properly maintained. The access road must be designed and located as to not be unduly affected by stream or spillway flows during heavy rainfall events. The road may be secured with a locked gate provided that the key is available to dam monitors

and State and local emergency personnel for emergency response.

8.2. Quality Control.

8.2.1. Construction Monitoring.

8.2.1.a. All construction activities shall be monitored by an engineer or his or her designated representative. Construction monitoring shall not be the responsibility of the construction contractor unless specifically approved by the director in writing .

8.2.1.b. Responsibility for assessing the quality of the workmanship and ascertaining compliance with the approved plans and specifications shall be vested primarily in the owner's engineer. The Dam Safety ~~Office~~ Section shall also monitor construction activities and workmanship in order to ascertain compliance with the approved plans and specifications, in accordance with the provisions of W. Va. Code § ~~20-5D-9~~ 22-14-9.

8.2.1.c. Critical phases of construction shall be monitored by the engineer or his or her designated representative constantly during active construction; noncritical phases of construction shall be checked at least once per day during active construction.

8.2.1.d. Additional supervision or testing will be required by the director if evidence of inadequate construction supervision exists.

8.2.2. Materials Testing - Construction materials shall be periodically tested on-site to ascertain compliance with design specifications in the approved plan package. Final quality control testing shall not be the responsibility of the construction contractor.

8.2.2.a. Concrete Testing - Routine tests of slump, air entrainment, and temperature shall be performed on each truck delivery. Cylinder samples for compression testing shall be taken each day or every twenty-five (25) cubic yards of delivered concrete, whichever is more frequent, unless otherwise required by the director.

8.2.2.b. Earth Fill Testing - Earth fill materials shall be tested for compaction and moisture content every alternate layer or each one thousand (1,000) cubic yards, whichever is more frequent. Random fill shall be evaluated for compliance with approved gradation specifications. Critical fill areas shall have gradation tests performed to evaluate compliance with the approved specifications.

8.2.2.c. Filter Materials Testing - Gradation tests shall be performed on filter materials. Close visual observation for signs of material segregation shall be performed. Additional tests may be required by the director to determine durability and soundness of the filter material.

8.3. Construction Inspections.

8.3.1. Inspections During Construction.

8.3.1.a. A visual inspection for construction progress, unstable conditions, quality control, and conformance with the approved plans and specifications shall be held at least once each working day (or more frequently as determined by the engineer). The inspection shall be performed by an engineer or a person under the direct supervision of the engineer. The frequency of inspection may be changed by the director depending upon specific project area conditions.

8.3.1.b. Additional inspections shall be held after each

heavy rainfall event in order to detect problems and propose remedial measures. These inspections shall be performed by an engineer or a person under the direct supervision of the engineer.

8.3.1.c. Instrumentation shall be monitored every seven (7) days unless otherwise specified by the engineer. Monitoring shall be performed by an engineer or a person under the direct supervision of the engineer. The frequency of monitoring may be changed by the director depending upon specific project area conditions.

8.3.2. Final Construction Inspection - Upon the completion of the construction or modification of a dam, a joint inspection shall be conducted by the director and the engineer. The purpose of the inspection is to verify that all work has been accomplished in accordance with the approved plan package.

8.3.3. Acceptance of Construction - When the dam owner is advised by the director that the construction appears satisfactory, the owner shall submit to the director a certification by an engineer that all construction was in substantial conformance with the approved plans and specifications, including any modifications that have been approved by the director. This certification shall be submitted within ninety (90) days of the director's advisement. As-built drawings, including all variations from the original specifications and changes in location of borrow or waste disposal areas, shall be submitted with the engineer's certification. If substantial modifications of the original specifications have been made during the construction period, the director may require that a corrected application form be submitted. Upon the receipt of the engineer's certification with the as-built drawings (and a corrected application form, if necessary), a letter of acceptance will be issued by the director.

8.3.4. Completed Dams - After acceptance of construction by the director, the dam and its appurtenances shall be inspected annually for a period of three (3) years by an engineer experienced in such inspections. The director reserves the right to attend any inspection and require prior notification of the inspection by the owner of the dam. A report of each inspection shall be prepared and filed with the director in accordance with the provisions of ~~Section~~ paragraph 15.5.1 of this rule.

8.4. Construction Reporting Requirements.

8.4.1. Monthly Progress Reports During Construction - A written report containing the results of each inspection of construction progress shall be submitted to the director every month while the dam and its appurtenances are under construction. The report shall include, but not be limited to, specific instrumentation readings, test results, freeboard, crest elevation, and specific construction or quality control problems with documentation of implemented solutions. Upon the completion of the construction or modification of the dam, notice shall be given by the dam owner to the director so that a final construction inspection can be made in accordance with the provisions of ~~Section~~ paragraph 8.3.2 of this rule.

8.4.2. Post-Construction Inspection Reports - A report shall be submitted to the director by the dam owner reporting the findings of the final construction inspection required under ~~Section~~ paragraph 8.3.2 of this rule. Certification by an engineer shall be submitted to the director with the inspection report to verify that the dam and its appurtenances were constructed in substantial conformance with the approved plans and specifications and that the dam and its appurtenances are functioning as designed.

**§ 47-34-9. Breaching of a Dam.**

9.1. Application to Breach a Dam - The owner of a dam must obtain a certificate of approval from the director prior to the breaching of the dam. A complete application in accordance with the provisions of ~~Section~~ subsection 5.1 of this rule must be submitted to and approved by the director prior to the commencement of breaching activities.

9.1.1. Plan Package Requirements - The plan package submitted in order to breach a dam shall be in accordance with the applicable requirements of Section 6 of this rule and must also include the specific requirements delineated in ~~Sections~~ subsection 9.2 through subsection 9.10 of this rule. Narratives, plans, or specifications required under Section 6 of this rule which are clearly not applicable to the proposed breaching activities may be omitted from the submittal; however, the director reserves the right to specify those items which must be included in the breaching plan package.

9.2. Breach Dimensions - The breach opening in the dam shall be designed so that any water resulting from design storm inflows that is temporarily impounded behind the residual structure shall be less than the height and storage requirements of a "dam" set forth in ~~Section 2.6~~ subsection 2.10 of this rule. The breach shall be to original stream bottom level, except that a small impoundment of less than one (1) acre-foot storage may be retained for sediment control purposes.

9.3. Breach Channel - The embankment shall be breached with a designed channel having the capacity to carry the peak runoff from the design storm corresponding to the dam's hazard classification. The channel created by the breach shall have an erosion-preventive lining adequate to withstand the depth and velocity of the peak flows from a P100 rainfall event. The channel side slopes shall achieve a minimum stability factor of safety of 1.5.

9.4. Safety - Reservoirs shall be completely drained before breaching operations begin. Breaching work shall be scheduled during dry weather using National Weather Service advice and proceed quickly to reduce the potential for impounding water.

9.5. Blasting - If blasting is to be used in the breaching of a dam, a blasting plan shall be submitted to the director for approval. The plan shall include the distance to existing structures and the measures that will be taken to minimize air blast and flying materials. A pre-blast survey of existing nearby structures and water wells which may be affected by blasting may be required by the director.

9.6. Erosion and Sediment Control - Erosion and sediment control measures sufficient to comply with the provisions of ~~Section~~ paragraph 8.1.13 of this rule shall be implemented during the breaching operation. The following measures shall also be implemented:

9.6.1. Reservoir areas, and the sediment deposits therein, shall be protected from erosion after the impounding capability has been eliminated by the breaching of the dam;

9.6.2. Silt deposits and barren areas in the reservoir shall be stabilized and revegetated;

9.6.3. Disturbed areas, including the faces on any remaining embankment, must be protected by vegetation or other means approved by the director;

9.6.4. A channel in the reservoir sediment may be required by the director in order to reestablish a stream channel; and

9.6.5. Permanent sediment basins, subject to ongoing

maintenance, may be required by the director if the dam owner cannot demonstrate the effectiveness of other structural and vegetative measures in stabilizing the reservoir area and dam site.

9.7. Placement of Earthen Material - Material removed from the dam shall be placed in waste disposal areas delineated in the approved plan package. The material shall be graded and compacted as necessary and stabilized from erosion by vegetation or other means approved by the director.

9.8. Placement of Non-Earthen Material - Concrete rubble and other rock material shall be placed in waste disposal areas delineated in the approved plan package. The material shall be placed in a manner to reduce hazardous conditions; protruding metal, wire, or bars are prohibited. The requirements of ~~Section~~ paragraph 8.1.14 of this rule shall apply to the disposal of any other waste materials generated by the breaching operation.

9.9. Galleries and Drains - The effect of flows through the breach and backwater pressure on galleries and drains shall be evaluated. The galleries and drains shall be vented or sealed as necessary to prevent failure of the remaining structure.

9.10. Safety of Remaining Structure - The remaining structure shall have sufficient strength to support the maximum hydraulic loading without failure. The engineer shall attempt to reduce or eliminate hazards associated with an "attractive nuisance."

9.11. Construction Practices - The requirements of Section 8 of this rule shall apply when breaching a dam unless clearly not applicable to the breaching operation; however, the director reserves the right to specify which requirements are applicable.

**§ 47-34-10. Removal of a Dam.**

10.1. Application to Remove a Dam - The owner of a dam must obtain a certificate of approval from the director prior to the removal of the dam. A complete application in accordance with the provisions of ~~Section~~ subsection 5.1 of this rule must be submitted to and approved by the director prior to the commencement of removal activities.

10.1.1. Plan Package Requirements - The plan package submitted in order to remove a dam shall be in accordance with the applicable requirements of Section 6 of this rule and must also include the specific requirements delineated in ~~Sections~~ subsection 10.2 through subsection 10.8 of this rule. Narratives, plans, or specifications required under Section 6 of this rule which are clearly not applicable to the proposed removal activities may be omitted from the submittal; however, the director reserves the right to specify those items which must be included in the removal plan package.

10.2. Removal Requirements - Removal of a dam shall consist of the complete removal of the structure to the original ground except in special cases where it may be necessary or advantageous to leave small sections of the structure. Unless otherwise approved by the director, the removal of a dam shall consist of complete removal of the structure to approximate original contour. A total of no more than ten percent (10%) of the length of the structure may remain at the abutment areas.

10.3. Safety - Reservoirs shall be completely drained before removal operations begin. Removal work shall be scheduled during dry weather using National Weather Service advice and proceed quickly to reduce the potential for impounding water.

10.4. Blasting - If blasting is to be used in the removal of a dam, a blasting plan shall be submitted to the director for approval. The plan shall include distance to existing structures and the measures that will be taken to minimize air blast and flying materials. A pre-blast survey of existing nearby structures and water wells which may be affected by blasting may be necessary.

10.5. Erosion and Sediment Control - Erosion and sediment control measures sufficient to comply with the provisions of ~~Section~~ paragraph 8.1.13 of this rule shall be implemented during the removal operation. The following measures shall also be implemented:

10.5.1. Reservoir areas, and the sediment deposits therein, shall be protected from erosion after the impounding capability has been eliminated by the removal of the dam;

10.5.2. Silt deposits and barren areas in the reservoir shall be stabilized and revegetated;

10.5.3. Disturbed areas, including the faces on any remaining embankment, must be protected by vegetation or other means approved by the director;

10.5.4. A channel in the reservoir sediment may be required by the director in order to reestablish a stream channel; and

10.5.5. Permanent sediment basins, subject to ongoing maintenance, may be required by the director if the dam owner cannot demonstrate the effectiveness of other structural and vegetative measures in stabilizing the reservoir area and dam site.

10.6. Placement of Earthen Material - Material removed from the dam shall be placed in waste disposal areas delineated in the approved plan package. The material shall be graded and compacted as necessary and stabilized from erosion by vegetation or other means approved by the director.

10.7. Placement of Non-Earthen Material - Concrete rubble and other rock material shall be placed in waste disposal areas delineated in the approved plan package. The material shall be placed in a manner to reduce hazardous conditions; protruding metal, wire, or bars are prohibited. The requirements of ~~Section~~ paragraph 8.1.14 of this rule shall apply to the disposal of any other waste materials generated by the removal operation.

10.8. Safety of Remaining Structure - If any portion of the structure remains, that portion shall have sufficient strength to support the maximum hydraulic loading without failure. The engineer shall attempt to reduce or eliminate hazards associated with an "attractive nuisance."

10.9. Construction Practices - The requirements of Section 8 of this rule shall apply when removing a dam unless clearly not applicable to the removal operation; however, the director reserves the right to specify which requirements are applicable.

**§ 47-34-11. Abandonment of a Dam.**

11.1. Application to Abandon a Dam - The owner of a dam must obtain a certificate of approval from the director prior to the abandonment of the dam. A complete application in accordance with the provisions of ~~Section~~ subsection 5.1 of this rule must be submitted to and approved by the director prior to the commencement of abandonment activities.

11.2. Reservoir Elimination - The reservoir area shall be completely filled

to the crest elevation of the dam with approved material to eliminate the impoundment of water. The maximum impounding capacity upon completion of final grading shall not exceed one (1) acre-foot of impounding capacity. The final top elevation of the reservoir fill shall be higher than, and sloped into, the diversion system required under ~~Section~~ subsection 11.4 of this rule.

11.3. Embankment Stability - The remaining embankment shall be shown to achieve a minimum factor of safety in accordance with the provisions of ~~Section 7.4.2.a.C~~ part 7.4.2.a.D of this rule.

11.4. Diversion System - A diversion system designed for a P100 rainfall event shall be provided to capture the stream at the upstream end of the reservoir and convey stream water and embankment runoff water around the site. The diversion system shall outlet safely beyond the downstream toe of the embankment in a natural drainway capable of carrying the design storm without excessive erosion. The director may require the installation of an energy dissipator in accordance with the provisions of ~~Section~~ item 7.4.2.d.B.(b)(F) of this rule.

11.5. Sealing Conduits - All conduits through the embankment, with the exception of underdrain conduits, shall be sealed with concrete at the upstream end prior to elimination of the reservoir. The director may require pressure testing of conduits to determine seal adequacy.

11.6. Erosion and Sediment Control - Erosion and sediment control measures sufficient to comply with the provisions of ~~Section~~ paragraph 8.1.13 of this rule shall be implemented during the abandonment operation.

11.7. Soil and Vegetative Cover - A sufficient layer of topsoil shall be provided to permit long-term growth of vegetation. A seeding and mulching mixture shall be proposed in the abandonment application to accomplish revegetation of the project area.

11.8. Retention of Jurisdiction - The director shall retain jurisdiction over the site for a minimum period of five (5) years after abandonment, during which time the dam and its appurtenances shall be inspected annually by an engineer experienced in such inspections. The inspections shall include measurement readings of instrumentation to determine the level and volume of saturation within the reservoir fill material. The director may also require more frequent reading and reporting of instrument readings to determine seasonal fluctuations of saturation. A report shall be filed with the director detailing the findings of each inspection and describing intended maintenance work. Should a major storm occur, a similar report shall be filed to detail the resultant condition of the structure.

11.9. Final Approval of Abandonment - At the completion of the five-year period, a final joint inspection by the engineer and the director shall be conducted to determine the effectiveness of the abandonment design and the potential need for continued maintenance. Should the director determine as a result of this inspection that an additional inspection time period or maintenance work is required, a letter detailing these requirements shall be sent to the owner. The director will review instrument records and annual inspection reports to determine if the saturation level of material within the reservoir has decreased in volume to less than the legal definition of a "dam." Should the director determine as a result of the inspection and review of instrumentation records that the volume of saturated material is less than the legal definition of a "dam" and the abandonment design has been effective, a letter of acceptance shall be issued stating that the dam has been properly abandoned.

**§ 47-34-12. Reduction or Enlargement of a Dam.**

12.1. Reduction of Dam Height To Less Than Jurisdiction.

12.1.1. A person planning to reduce the height of a dam so that the remaining structure will no longer meet the definition of "dam" set forth in ~~Section 2.6~~ subsection 2.10 of this rule must obtain a certificate of approval from the director.

12.1.2. A complete application in accordance with the provisions of ~~Section~~ subsection 5.1 of this rule must be submitted to and approved by the director prior to the commencement of reduction activities. The application must also contain information showing that the remaining impounding structure will not cause loss of life or appreciable property damage downstream should that structure fail.

12.1.2.a. Plan Package Requirements - The plan package submitted in order to reduce the height of a dam shall be in accordance with the applicable requirements of Section 6 of this rule and must also include the specific requirements delineated in ~~Sections~~ paragraph 12.1.3 and paragraph 12.1.4 of this rule. Narratives, plans, or specifications required under Section 6 of this rule which are clearly not applicable to the proposed reduction may be omitted from the submittal; however, the director reserves the right to specify those items which must be included in the reduction plan package.

12.1.3. The remaining structure shall have a properly designed spillway system capable of passing a ~~Class A~~ Class 3 design storm without overtopping.

12.1.4. The remaining structure shall achieve a factor of safety in accordance with the provisions of ~~Section~~ part 7.4.2.a.C or part 7.4.2.b.B of this rule as appropriate to the type of structure.

12.1.5. The requirements of Section 8 of this rule apply when reducing the height of a dam unless clearly not applicable to the reduction operation; however, the director reserves the right to specify which requirements are applicable.

12.1.6. The director shall retain jurisdiction over the remaining structure until the reduction operation is completed and a letter of acceptance has been issued by the director.

12.2. Enlargement of a Structure to Jurisdiction.

12.2.1. A person planning to enlarge an existing structure so that the completed structure will meet the definition of "dam" set forth in ~~Section 2.6~~ subsection 2.10 of this rule must obtain a certificate of approval from the director.

12.2.2. A complete application in accordance with the provisions of ~~Section~~ subsection 5.1 of this rule must be submitted to and approved by the director prior to the commencement of enlargement activities.

12.2.2.a. Plan Package Requirements - The plan package submitted in order to enlarge a structure to jurisdiction shall be in accordance with the applicable requirements of Section 6 of this rule. Narratives, plans, or specifications required under Section 6 of this rule which are clearly not applicable to the proposed enlargement may be omitted from the submittal; however, the director reserves the right to specify those items which must be included in the enlargement plan package.

12.2.3. The director will require adequate drilling and testing of the existing structure and foundation to ascertain inplace conditions.

12.2.4. The requirements of Section 8 of this rule shall apply when enlarging a structure to jurisdiction unless clearly not applicable to the enlargement operation; however, the director reserves the right to specify which requirements are applicable.

**§ 47-34-13. Dams Completed Before July 1, 1973.**

13.1. Complete Application Required - An application for a certificate of approval shall be submitted to the director for all dams completed before July 1, 1973 which meet the definition of "dam" set forth in ~~Section 2.6~~ subsection 2.10 of this rule. If the engineer can demonstrate that the dam meets the design requirements specified in this rule, an application for approval of an existing dam shall be submitted. If the dam requires modification to meet the requirements, an application for modification of an existing dam shall be submitted. If the above options are not exercised by the dam owner, an application to breach, remove, or properly abandon the dam pursuant to this rule shall be submitted.

13.2. Performance Requirements - To receive a certificate of approval, all dams completed before July 1, 1973 shall meet the applicable design requirements of Section 7 of this rule. Those dams which do not meet the design requirements of Section 7 of this rule shall be modified, breached, removed, or properly abandoned pursuant to the provisions of this rule.

13.3. Plan Package Requirements - The plan package submitted for approval or modification of an existing dam shall be in accordance with applicable requirements of Section 6 of this rule, except that testing and analysis results may be substituted for design specifications. If as-built drawings are not available, the engineer may substitute drawings prepared by him or her which represent the existing conditions at the dam as determined through the testing and analysis program.

**§ 47-34-14. Sale or Transfer of a Dam.**

14.1. Notification and Documentation - Within thirty (30) days after the sale or transfer of a dam, the director must be notified of that transaction by the person who was issued the certificate of approval for the dam.

14.1.1. The seller of a dam must provide the following documentation to the director:

14.1.1.a. The name and address of new owner;

14.1.1.b. A copy of the signed agreement between the previous and new owner acknowledging certificate of approval responsibility and including any warranties, insurance coverage, or liability agreements between the parties;

14.1.1.c. The effective date of the ownership or responsibility transfer; and

14.1.1.d. Documentation that a copy of the certificate of approval or the most recent Dam Control Act notice to comply or order -- if a valid certificate of approval does not exist -- has been entered in the deed or land records of the county in which the dam is located.

14.1.2. The director may reissue a corrected certificate of approval reflecting the sale or transfer of a dam upon the receipt of appropriate documentation and fees.

**§ 47-34-15. Dam Operations and Safety.**

15.1. Safe Operations - The owner of a dam shall ensure that his or her dam is operated in a safe and responsible manner so as not to endanger life or property.

15.2. Operations Plan - Owners of dams which require the operation of gates, penstocks, or other means of regulating the reservoir level or downstream flow shall develop and submit an operations plan to the director for approval.

15.2.1. Plan Contents - The operations plan shall include, but not be limited to, normal and seasonal operational procedures for gates, penstocks, and other reservoir or downstream flow regulating devices. The name, address, and telephone number of each individual authorized to operate the dam shall also be included in the plan.

15.2.2. Plan Implementation - The operations plan shall be implemented immediately upon approval by the director and shall be updated periodically as necessary to reflect any changes in personnel or operation procedures.

15.3. Releasing Water - The owner of a dam may release water or lower the reservoir elevation through the use of gates without prior approval of the director provided that the release of water will not adversely affect the dam structure, property, or water quality or pose a hazard to human life.

15.3.1. Emergency Releases of Water - Under emergency conditions, the owner of a dam may release water at a rate which may violate the criteria established under ~~Section~~ subsection 15.3 of this rule provided that such emergency release will not pose an unjustifiable hazard to human life. Notification must be given of a pending emergency release of water in accordance with the provisions of ~~Section~~ paragraph 15.8.1 of this rule. In accordance with the provisions of W. Va. Code ~~§ 20-5D-13~~ 22-14-12, this regulatory provision shall not relieve the owner of the dam of any liabilities resulting from an emergency release of water.

15.3.2. Low Flow Augmentation - The director may require the owner of a dam to maintain a specified stream flow below the dam or to augment the stream flow for appropriate in-stream uses.

15.4. Dam Safety Inspections - Periodic inspections of dams shall be performed to monitor and assess the condition of the dam. These scheduled safety inspections of completed dams shall be in the charge of an engineer.

15.4.1. Inspections by the Dam Owner - The owner of a dam or his or her agent shall perform safety inspections monthly or more frequently. Such inspections must survey the dam and its appurtenances to check for problems or changes since the last inspection. The owner or his or her agent shall inspect the dam more frequently than once per month during adverse weather conditions. The owner shall report any observed problems to the director.

15.4.2. Inspections by the Director - The director may inspect any dam at any time in accordance with the provisions of W. Va. Code ~~§ 20-5D-4(i)~~ 22-14-4(i).

15.4.3. Inspections by the Owner's Engineer - An engineering inspection shall be conducted annually for three (3) years after the completion of any dam, in accordance with the provisions of ~~Section~~ paragraph 8.3.4 of this rule. Upon the conclusion of this three-year period, the dam shall be inspected by the owner's engineer at the frequency specified in ~~Sections~~ subparagraph 15.4.3.a through subparagraph 15.4.3.c of this rule as appropriate to the hazard classification of the dam. The director may require additional inspections based

upon site conditions. The director reserves the right to attend any inspection and require prior notification of the inspection from the owner of the dam.

15.4.3.a. Class 4 dams shall be inspected at least once every seven (7) years.

~~15.4.3.a.~~ 15.4.3.b. ~~Class A~~ Class 3 dams shall be inspected at least once every five (5) years.

~~15.4.3.b.~~ 15.4.3.c. ~~Class B~~ Class 2 dams shall be inspected at least once every three (3) years.

~~15.4.3.c.~~ 15.4.2.d. ~~Class C~~ Class 1 dams shall be inspected at least once every two (2) years.

15.4.4. Inspection of Dams with Serious Problems - The director may establish the frequency of inspection of dams with serious problems for both inspections by the dam owner under ~~Section~~ paragraph 15.4.1 of this rule and inspections by the owner's engineer under ~~Section~~ paragraph 15.4.3 of this rule. The inspection of a dam with serious problems shall monitor slopes, seepage, bulges, scarps, vertical displacement, excessive erosion, piping, sudden changes in monitoring devices, and other visible factors which could indicate potential failure of the embankment, spillways, or other appurtenances. The director reserves the right to attend any inspection and require prior notification of the inspection by the owner of the dam.

15.5. Dam Safety Inspection Reports.

15.5.1. Inspection Reports for Completed Dams - A written report containing the observations of each inspection that is required under ~~Sections~~ paragraph 8.3.4 and paragraph 15.4.3 of this rule shall be submitted to the director by the dam owner within thirty (30) days of the inspection. The report shall also describe maintenance work to be performed as a result of the inspection findings. Should a storm equal to or greater than a 50-year, 6-hour rainfall event occur, a similar report shall be filed to detail the resultant condition of the structure. Certification by an engineer shall be submitted to the director with each inspection report to verify that the dam and its appurtenances are functioning as designed.

15.5.2. Inspection Reports for Dams with Serious Problems - A written report containing the observations of each inspection required under ~~Section~~ paragraph 15.4.4 of this rule shall be submitted to the director by the dam owner within thirty (30) days of the inspection.

15.6. Monitoring Plans - Owners of ~~Class C~~ Class 1 dams shall formulate and submit a monitoring plan to the director for approval. Owners of ~~Class A and Class B~~ Class 2 and 3 dams may be required by the director to formulate and submit a monitoring plan for approval.

15.6.1. The monitoring plan developed by the dam owner must follow the format of the example plan provided by the director and shall include, but not be limited to, the following:

15.6.1.a. A description of the dam, including appropriate drawings and location maps;

15.6.1.b. A listing of problems and deficiencies and any implemented repairs;

15.6.1.c. The inspection frequency under varying weather conditions;

15.6.1.d. A description of areas or items to be inspected;

15.6.1.e. Corrective actions to be taken;

15.6.1.f. The responsible persons' names, addresses, and telephone numbers;

15.6.1.g. The method of notification of the director and county emergency services authorities; and

15.6.1.h. Other items required by the director based upon site-specific conditions.

15.6.2. Monitoring plans shall be updated annually. More frequent updating of the plans may be required by the director based upon rapidly changing personnel or site conditions. The monitoring plan shall be implemented immediately by the dam owner upon the approval of the plan by the director.

15.7. Emergency Action Plans - Owners of ~~Class C~~ Class 1 dams shall formulate and submit an emergency action plan to the director for approval. Owners of ~~Class A and Class B~~ Class 2 and 3 dams may be required by the director to formulate and submit an emergency action plan for approval.

15.7.1. The emergency action plan developed by the dam owner must follow the format of the example plan provided by the director.

15.7.2. The dam owner shall coordinate with county emergency service authorities in the development of the emergency action plan. The dam owner must provide copies of the inundation maps required under ~~Section~~ subparagraph 3.5.3.b of this rule to those authorities.

15.7.3. The dam owner shall provide county emergency services authorities with a copy of the monitoring plan, and all updates of that plan, approved by the director pursuant to ~~Section~~ subsection 15.6 of this rule.

15.8. Emergency Procedures.

15.8.1. Emergency Condition - If the owner of a dam determines that an emergency exists, he or she shall immediately notify any person who may be endangered if the dam should fail and then notify the appropriate county emergency services authorities and the director. After providing notification of the emergency condition, the owner shall immediately take any remedial action, such as an emergency release of water, that is necessary to protect life and property. The director may waive the requirement for a certificate of approval, as required under Section 4 of this rule, where it is necessary to accomplish repairs under emergency conditions.

15.8.2. Dangerous Condition - Should a dangerous condition develop, the director shall be informed immediately. The owner of the dam shall immediately take any remedial action necessary to protect life and property. Emergency procedures developed in accordance with the provisions of ~~Sections~~ subsection 15.6 and subsection 15.7 of this rule shall be implemented to protect life and property downstream. The site shall be inspected and monitored at least once every eight (8) hours until the emergency situation is alleviated. Continuous monitoring may be required by the director when there is an imminent danger to the health, safety, or welfare of the public.

15.8.3. Evaluation of Dangerous Conditions - If a dangerous condition develops, an engineering evaluation shall be initiated as soon as possible to formulate a plan for permanent correction of the dangerous condition. The evaluation and corrective action plan shall be submitted to and approved by the director prior to implementation.

15.9. Dam Owner Not Relieved of Responsibility - The director's approval of a monitoring plan, or updates to such a plan, pursuant to ~~Section~~ subsection 15.6 of this rule or his or her approval of an emergency action plan pursuant to ~~Section~~ subsection 15.7 of this rule shall not relieve the dam owner of his or her legal duties, obligations, or liabilities under W. Va. Code §§ ~~20-5D-10 and~~ ~~20-5D-12~~ 22-14-10 and 22-14-12.

**§ 47-34-16. Dam Maintenance.**

16.1. General Maintenance Requirements.

16.1.1. Required Maintenance - Each dam shall be maintained in accordance with the plans and specifications approved under the applicable certificate of approval. The director may require maintenance to be performed on a dam, whether or not a certificate of approval has been issued for that dam.

16.1.2. Maintenance Plan - Owners of dams shall formulate and submit a written maintenance plan to the director for approval. The maintenance plan shall include, but not be limited to, schedules for maintaining embankments, concrete structures, vegetative or rock covers, gates, gate mechanisms, penstocks, or other reservoir-regulating devices, spillways, and appurtenances. The maintenance plan shall be implemented immediately by the dam owner upon the approval of the plan by the director. The maintenance plan shall be updated periodically as necessary to reflect changing site conditions.

16.2. Specific Maintenance Requirements.

16.2.1. All spillways and appurtenances shall be maintained to operate in accordance with the plans and specifications approved under the applicable certificate of approval.

16.2.2. All failures resulting from landslides or slope failures shall be corrected immediately if the failures significantly affect the safety or design capacity of the dam or its appurtenances. All failures shall be reported to the director.

16.2.3. All pipes shall be repaired or replaced when damaged, or distorted, or if they otherwise fail to function properly in accordance with the plans and specifications approved under the applicable certificate of approval.

16.2.4. Leakage through joints, fissures, and cracks through or under the spillway channel shall be immediately investigated and repaired.

16.2.5. Any new gate which has been installed in a new dam or in the repair or modification of an existing dam, or any gate which has been opened within five (5) years prior to inspection by the director, shall be opened to at least thirty-three percent (33%) of its maximum capacity at least once annually. Gates not meeting the above requirements may remain closed until operated for the purposes of the owner or to alleviate an emergency condition and shall thereafter be opened at least once annually. All gate mechanisms shall be lubricated annually regardless of the operational status of the gate.

16.3. Routine Maintenance.

16.3.1. Routine maintenance of spillways shall be performed. Such maintenance shall include the removal of sediment, brush, trees, obstructions, and rocks in stilling basins and the re-establishment of the structure to its original hydraulic design.

16.3.2. Routine inspections shall be made of all hydraulic structures in order to maintain proper operation. Special inspections shall be

conducted whenever a significant flow through the structures has occurred.

16.3.3. If erosion on the embankment face or abutments occurs, the area shall be regraded and be provided with adequate drainage control or revegetation to prevent future occurrences.

16.3.4. All concrete structures and channel linings shall be maintained in accordance with the plans and specifications approved under the applicable certificate of approval. All cracks located in concrete channels shall be sealed immediately with a sealant approved by the director.

16.3.5. Access roads shall be maintained in order to provide access for emergency inspections, vehicles, and equipment.

16.3.6. The embankment or concrete structure of a dam shall be kept clear of trees and shrubs. The downstream toe and abutments of the dam shall be cleared to natural ground for a lateral distance of at least twenty-five (25) feet. All dams with vegetative covers shall be mowed at least once annually. Grazing by farm animals shall be controlled to prevent animal trails or other damage to the vegetative cover.

16.3.7. The embankment shall be kept clear of burrowing animals.

16.3.8. All monitoring devices shall be routinely inspected and repaired or replaced as necessary so that the devices function properly.

**§ 47-34-17. Dam Repairs.**

17.1. General Repair Requirements - The director may require repairs to be performed on a dam, whether or not the dam has a certificate of approval. Major repairs shall require a certificate of approval, issuance of which may or may not constitute final approval of the dam, as determined by the director.

17.1.1. Routine Repairs (No Certificate Required) - Repairs conducted in accordance with the provisions of ~~Section~~ subsection 16.3 of this rule shall not normally require an application for a certificate of approval; however, the director may require such an application based upon site-specific conditions.

17.1.2. Major Repairs (Certificate Required) - Any repairs to a dam other than routine repairs listed in ~~Section~~ subsection 16.3 of this rule shall require an application for a certificate of approval in accordance with the provisions of this rule.

17.2. Specific Repair Requirements.

17.2.1. Removal of Trees and Tree Roots - All trees shall be removed from the embankment and abutment areas, unless otherwise approved by the director based upon site-specific conditions. Small trees with a base diameter of four (4) inches or less may be removed without removing the root system unless specific problems with the root system are evident. Larger trees may require special care in removal. The director may require the removal of root systems of large trees if the potential for seepage along the root system exists. If removal of root systems requires extensive excavation of the embankment, the removal shall be considered a major repair requiring a complete application for a certificate of approval.

**§ 47-34-18. Application and Annual Registration Fees.**

18.1. Application Fees - Each application submitted to place, construct,

enlarge, alter, repair, remove or abandon a dam shall include an application fee. No fee, however, shall be assessed for dams designed and constructed by the soil conservation service for soil conservation districts. The following application fees apply:

18.1.1. The application fee for placement, construction, alteration, enlargement, repair, or approval of a dam is three hundred dollars.

18.1.2. The application fee for breaching, or abandonment of a dam is two hundred dollars.

18.1.3. The application fee for removal of a dam is one hundred dollars.

18.2. Annual Registration Fees - Owners of existing dams holding certificates of approval shall be assessed an annual registration fee. In accordance with provisions of the Dam Control and Safety Act, West Virginia Code § ~~20-5B-7~~ 22-14-7, existing certificates of approval will be extended for one year upon receipt of the annual registration fee, an inspection report in accordance with ~~Section~~ subsection 15.5 of this rule, a monitoring and emergency action plan in accordance with ~~Sections~~ subsection 15.6 and subsection 15.7 of these regulations, and a maintenance plan in accordance with ~~Section~~ paragraph 16.1.2 of these regulations; Provided that where an approved, up-to-date: inspection report; monitoring and emergency action plan; and maintenance plan are on file in the Dam Safety ~~Office~~ Section, and where no outstanding violation(s) exist, then the certificate of approval will be extended without resubmission of the foregoing documents upon receipt of the annual registration fee. No fee shall be assessed, however, for dams designed and constructed by the soil conservation service for soil conservation districts. The following annual registration fees apply:

18.2.1. Class 4 dams shall be assessed twenty-five dollars.

~~18.2.1.~~ 18.2.2. ~~Class A~~ Class 3 dams shall be assessed fifty dollars.

~~18.2.2.~~ 18.2.3. ~~Class B~~ Class 2 dams shall be assessed seventy-five dollars.

~~18.2.3.~~ 18.2.4. ~~Class C~~ Class 1 dams shall be assessed one hundred dollars.

18.3. Any certificate of approval issued pursuant to W. Va. Code § ~~20-5B-17~~ 22-14-17 and this rule is void without notification to the person holding the certificate of approval when the annual registration fee is more than one hundred eighty (180) days past due. Resubmission of an application in accordance with section 5 of this rule is required where a certificate has become void due to failure to pay the appropriate annual registration fee within 180 days of the date due.

**§ 47-34-19. Civil Administrative Penalties.**

19.1. Enforcement Actions.

19.1.1. General - An authorized representative of the director may commence an enforcement action for any observed violation.

19.1.2. Enforcement Action Procedures - An enforcement action shall be in writing, shall be signed by the director or other authorized representative of the director, and shall set forth with reasonable specificity:

19.1.2.a. The nature of the enforcement action with a reference to the section of the statute, rule, regulation, notice, order or certificate of approval term that was allegedly violated;

19.1.2.b. The time and date of the observance of the violation;

19.1.2.c. A reasonable description of the dam where the violation was observed, where within the operation or maintenance of the dam the observation was observed, and the condition or hazard determined by the director;

19.1.2.d. The name, ownership and location of the dam and any identification number associated with it; and

19.1.2.e. In those instances where a notice or order has not been previously issued, the remedial action necessary to alleviate the violation and time limits for accomplishing the remedial action.

19.2. Penalty Assessment Procedures.

19.2.1. Review of Enforcement Action and Penalty Calculation - The director shall review each enforcement action issued for civil administrative penalty assessment to determine:

19.2.1.a. The appropriateness of a civil administrative penalty;

19.2.1.b. The initial amount of penalty, if any, based upon the rates and methods given in subsection 19.5 of this rule;

19.2.1.c. The appropriateness of assessing a daily civil administrative penalty for continuing violations;

19.2.1.d. The total initial civil administrative penalty assessed; and

19.2.1.e. The appropriateness of assessing a separate civil administrative penalty against an individual person.

19.2.2. Notice of Civil Administrative Penalty - The director shall provide the violator with a copy of the enforcement action and:

19.2.2.a. A notice of civil administrative penalty which shall include procedures for requesting an informal hearing and a notification of applicable time constraints; or

19.2.2.b. A notice of dismissal.

19.3. Hearings and Appeals.

19.3.1. Right to Informal Hearing - The violator has twenty (20) calendar days from his or her receipt of the notice of civil administrative penalty within which to request, in writing, an informal hearing before the assessment officer. If a hearing is requested, the assessment officer will hold the hearing within 60 days to deduce the actual facts and circumstances regarding the violation and, based thereon, will make a final recommendation of civil administrative penalty assessment to the director. If no hearing is requested, the notice of civil administrative penalty becomes a final order after the expiration of the twenty-day period and the civil administrative penalty becomes due and payable.

19.3.2. Notice and Scheduling of Informal Hearing - If the

violator requests an informal hearing within the twenty-day period, the assessment officer shall schedule a hearing in accordance with the following procedures:

19.3.2.a. The time and place the informal hearing is to be held is to be communicated to any authorized representative of the director who filed an enforcement action bringing about the informal hearing, to the violator and to any person who has expressed an interest in writing concerning the enforcement action;

19.3.2.b. The communication shall be provided at least fifteen (15) calendar days prior to the time of the hearing; and

19.3.2.c. The assessment officer may continue the informal hearing only for good cause shown.

19.3.3. Informal Hearing Procedures - An informal hearing, as provided by this rule, is intended to be an informal discussion of the facts which gave rise to the issuance of an enforcement action and shall be conducted in the following manner:

19.3.3.a. The West Virginia Rules of Civil Procedure and West Virginia Rules of Evidence shall not apply;

19.3.3.b. A record of the informal hearing is not required but may be made by any party to the hearing at the party's expense; and

19.3.3.c. At formal review proceedings which may ensue, no evidence as to any statement made by one party at the informal hearing may be introduced as evidence by another party, nor may any statement be used to impeach a witness, unless the statement is or was available as competent evidence independent of its introduction during the informal hearing.

19.3.4. Written Decision - Within thirty (30) calendar days following the informal hearing, the director shall issue and furnish to the violator a written decision affirming, increasing, decreasing, or dismissing the initial civil administrative penalty assessment and giving the reasons for the decision.

19.3.5. Request for Formal Hearing - Within thirty (30) calendar days after notification of the director's informal hearing decision, the violator may request a formal hearing of the assessment in accordance with the provisions of W. Va. Code 29A-5-1, 2, and 3. If no formal hearing is requested, the director's decision becomes a final order after the expiration of the thirty day period and the civil administrative penalty becomes due and payable.

19.3.6. Request for Judicial Review - Within thirty (30) calendar days after notification of the director's formal hearing decision, the violator may request a judicial review of the assessment in accordance with the provisions of W. Va. Code 29A-5-4. If no judicial review is requested, the director's decision becomes a final order after the expiration of the thirty day period and the civil administrative penalty becomes due and payable.

19.4. Separate Civil Administrative Penalties.

19.4.1. The director may assess a separate civil administrative penalty against any corporate director, officer, agent, or employee of a violator, or any other person, who authorizes, orders, or carries out a violation of the statute, rule, regulation, order, or certificate of approval term or who fails or refuses to follow an order from the director.

19.4.2. In determining the amount of a civil administrative

penalty to be assessed against a person, consideration shall be given to the criteria specified in subsection 19.5 of this rule.

19.4.3. The director shall serve on each person to be assessed an administrative penalty a notice of separate civil administrative penalty assessment. For purposes of this subsection of this rule, service is considered sufficient if it satisfies Rule 4 of the West Virginia Rules of Civil Procedure for service of a summons and complaint. A notice of separate civil administrative penalty assessment shall include:

19.4.3.a. A reference to the section of the statute, rule, regulation, order, or certificate of approval term allegedly violated;

19.4.3.b. A concise statement of the facts alleged to constitute the violation;

19.4.3.c. A statement of the amount of the separate civil administrative penalty to be imposed;

19.4.3.d. A copy of the underlying enforcement action; and

19.4.3.e. A statement of a person's right to an informal hearing.

19.4.4. A person shall have twenty (20) calendar days from receipt of the notice of separate civil administrative penalty assessment in which to request, in writing, an informal hearing before the assessment officer. If no hearing is requested, the notice of separate civil administrative penalty becomes a final order after expiration of the thirty-day period and the separate civil administrative penalty becomes due and payable.

19.4.5. The informal hearing, if requested, will be scheduled and conducted pursuant to this section.

19.5. Civil Administrative Penalty Calculation Procedures.

19.5.1. The director shall calculate a civil administrative penalty by taking into account the seriousness of the alleged violation, good faith efforts on the part of the violator (as provided for in paragraph 19.5.3 of this section) and any history of violations by the violator.

19.5.2. History of Violations (HOV) - The director shall take into account the violator's history of violations by determining if any enforcement actions concerning Certificate terms, requirements of the Act, regulations requirements, notices to comply or any orders have been taken against the violator during twenty-four (24) months prior to the violation. Those enforcement actions which were withdrawn, dismissed, or vacated shall not be included in the determination. Any outstanding violation within the time period shall constitute a history of violations.

19.5.3. Good Faith Effort - A good faith effort shall be considered as completion of nearly all requirements of the Certificate, Act, Regulations, notice to comply or order in question. Good faith may still be determined when minor aspects of the requirements which do not affect the safety of the dam have not been completed by the violator.

19.5.4. Maximum Assessed Penalty - Assessment of civil administrative penalties shall not exceed two hundred dollars per day per violation. The total assessed penalty for any violation shall not exceed of four hundred dollars.

19.5.5. Penalty Without Good Faith Effort by Violator - The civil

administrative penalty shall be determined through the use of Table A of this rule.

19.5.6. Penalty With Good Faith Efforts by Violator - The civil administrative penalty shall be determined through the use of Table B of this rule.

**TABLE A**

Seriousness of Violation
(dollars/day/violation)

| | No Hazard | | Serious Problem | | Dangerous Condition | |
|---|---|---|---|---|---|---|
| | No HOV | With HOV | No HOV | With HOV | No HOV | With HOV |
| Certificate | 10 | 25 | 30 | 50 | 100 | 200 |
| Dam Control Act | 25 | 50 | 60 | 75 | 125 | 200 |
| Regulations | 50 | 75 | 85 | 100 | 150 | 200 |
| Notice to Comply | 75 | 100 | 125 | 150 | 175 | 200 |
| Order | 100 | 125 | 150 | 175 | 185 | 200 |

**TABLE B**

With Good Faith Efforts to Comply
(dollars/day/violation)

| | No Hazard | | Serious Problem | | Dangerous Condition | |
|---|---|---|---|---|---|---|
| | No HOV | With HOV | No HOV | With HOV | No HOV | With HOV |
| Certificate | 0 | 20 | 20 | 45 | 90 | 195 |
| Dam Control Act | 15 | 45 | 50 | 70 | 115 | 195 |
| Regulations | 40 | 70 | 75 | 95 | 140 | 195 |
| Notice to Comply | 65 | 95 | 115 | 145 | 170 | 195 |
| Order | 90 | 120 | 140 | 170 | 180 | 195 |

Note: HOV = History of Violations

DAM SAFETY REGULATIONS

INDEX


Abandonment . . . . . 1, 14, 43, 44, 53
Access Road . . . . . 38
Annual Registration Fee . . . . . 53, 54
Application Fee . . . . . 53
Appurtenances . 1, 3, 6, 7, 15, 18, 20, 21, 32, 34, 35, 39, 40, 44, 48, 49, 51
Assessment Officer . . . . . 1, 5, 55, 57
Average Time Headway . . . . . 1, 4
Blasting . . . . . 16, 35, 41, 42
Borrow . . . . . 6, 15, 18, 24, 34, 36, 39
Breach . . . . . 1, 10, 12, 40, 41, 46
Bridge . . . . . 2, 4, 8
Certificate of Approval 2, 5, 7-9, 11-13, 18, 33, 40, 42, 43, 45-47, 50-54, 56
Channel . . . . . 1-3, 5, 6, 16, 21-23, 30, 31, 35, 36, 40, 41, 43, 51, 52
Concrete . . . . . 7, 16, 25-28, 31, 32, 35, 37, 38, 41, 43, 44, 51, 52
Conduit . . . . . 23, 24, 29, 30
Dam . . . . . i, 1-16, 18-26, 28-33, 35-54, 57-59
Dam Break . . . . . 4, 5, 10
Dam Safety . . . . . i, 1, 3, 14, 19, 33, 38, 48, 49, 53, 59
Dangerous Condition . . . . . 3, 6, 28, 50, 58
Design Storm . . . . . 3, 4, 11, 20-22, 29, 33, 40, 44, 45
Director . . . . . 1-3, 5, 7-20, 23, 25-57
Diversion . . . . . 2, 3, 7, 16, 18, 35, 36, 44
Dust . . . . . 16, 37
Emergency Action Plan . . . . . 50, 51, 53
Emergency Condition . . . . . 3, 50, 51
Emergency Spillway . . . . . 3, 6, 21, 22, 28
Enforcement Action . . . . . 3, 54, 55, 57
Engineer . . . . . 3, 13, 14, 25, 26, 31, 32, 35, 38-40, 42-44, 46, 48, 49
Factor of Safety . . . . . 6, 29, 40, 44, 45
Freeboard . . . . . 3, 7, 40
Geotechnical Engineering . . . . . 4, 25
Gravity Dam . . . . . 29
Hazard Classification . . . . . 4, 9-11, 20, 22, 24, 40, 48
High Risk Highway . . . . . 4, 9, 26
Highway . . . . . 2, 4, 6, 9-11, 17, 26
Hydraulic . . . . . 3, 6, 20, 22, 23, 30-32, 42, 43, 52
Hydrologic . . . . . 4, 19-21
Hydrology . . . . . 4
Impoundment . . . . . 3, 4, 6, 8-10, 21, 22, 24, 30, 35, 36, 40, 43
Incised Reservoir . . . . . 4, 8
Inspection . . . . . 3, 15, 17, 34, 39, 40, 44, 48, 49, 51, 53
Instrumentation . . . . . 17, 32, 39, 40, 44
Low Risk Highway . . . . . 4, 10
Maintenance Plan . . . . . 51, 53
Major Damage . . . . . 4, 5, 9, 10, 26
Major Repairs . . . . . 12, 52
Minor Damage . . . . . 5, 10
Monitoring Plan . . . . . 49, 50
Natural Bed . . . . . 2, 5, 7, 8
Natural Drainway . . . . . 1, 2, 5, 6, 9, 21, 29, 30, 36, 44
Notice . . . . . 5, 7, 12, 40, 47, 54-58
Notice of Civil Administrative Penalty . . . . . 5, 55
Notice of Dismissal . . . . . 5, 55
Order . . . . 5, 7-10, 12, 14, 23, 24, 26, 31, 34, 36, 38-43, 45-47, 52, 54-58
P100 . . . . . 5, 20, 23, 33, 40, 44
Person . . . . . 1-3, 5, 7, 12, 13, 33, 39, 45, 46, 50, 54-57
Piezometer . . . . . 32

Pipe . . . . . 23, 24, 27, 29, 30, 32
Piping . . . . . 6, 24, 26, 30, 32, 48
Plan Package . . . . . 12-21, 24-26, 28, 33, 35, 37-43, 45, 46
PMP . . . . . 6, 21
Principal Spillway . . . . . 3, 6, 21, 22, 35
Project Area . . . . . 6, 16-18, 24, 25, 32-37, 39, 44
Removal . . . . . 1, 6, 14, 34, 36, 42, 43, 52, 53
Risk Assessment . . . . . 11, 20, 22
Roadfill . . . . . 4, 6, 8
Routine Repairs . . . . . 52
Safety Factor . . . . . 6, 25, 27, 28
Sediment . . . . . 4, 6, 7, 15, 16, 19, 32, 35-37, 40-44, 52
Seepage . . . . . 24-28, 30, 31, 48, 53
Serious Problem . . . . . 6, 31, 58
Significant Harm to the Environment . . . . . 3, 6, 9, 10
Site . 1, 6, 7, 11, 15, 19, 20, 24, 26, 28, 32, 33, 37, 38, 41, 43, 44, 48-53
Stability . . . . . 18, 25, 27-29, 40, 44
Subsidence . . . . . 7, 15, 24, 25
Upstream Hazards . . . . . 11
Violator . . . . . 3, 5, 7, 55-57
Waste Disposal . . . . . 6, 7, 9, 10, 16, 18, 22, 29, 32, 33, 37, 39, 41, 43
Waste Disposal Dam . . . . . 9, 10
Wetlands . . . . . 13
Written Decision . . . . . 7, 56

DAM SAFETY REGULATIONS
TITLE 47 SERIES 34

RESPONSIVENESS SUMMARY

The West Virginia Division of Environmental Protection (DEP) has received thoughtful criticism during the public notice and comment period on proposed amendments to the **Dam Safety Regulations**. The proposed amendments provide for expanded guidance for application of storm requirements passed by the 1993 Legislature. The rule also provides for clarification of hazard classification, drain pipe requirements, and end of jurisdiction determination criteria for abandonment of dams. In addition, the rule addresses determination of risk to persons on highways, use of risk assessment, and concrete dam stability requirements.

A public notice on the proposed rule was published in eight state newspapers on July 7, 1994. The notice stated that a public hearing would be held on August 1, and that the public comment period would end on August 8, at 4:00 p.m.

The public hearing on August 1 was attended by James Waycaster, Brian Long and Roger Hall of DEP, Mr. Robert Foster of the West Virginia Manufacturers Association, Mr. Onas Aliff and Mr. Larry Nottingham of Triad Engineering, Inc., and Dr. George Hall of Terra Engineers, Inc.

All oral and written comments and concerns pertaining to the proposed amendments were reviewed and considered in developing the final rules. DEP notes that several commentors necessarily addressed multiple inter-related regulations issues within a narrative format, making a simple agency response difficult. Although some continuity of complex issues may be lost, the comments and responses are organized in the order of the regulations. General comments are addressed at the end of the summary.

RESPONSE TO SPECIFIC COMMENTS:

Fiscal Note

COMMENT: Lake Floyd Club, Inc. (Floyd) questioned the need for expanded guidance for design storm requirements enacted by the 1992 legislature.

RESPONSE: DEP believes the expanded guidance is necessary and beneficial. Floyd's specific comments regarding design storm requirements are addressed below.

subsection 1.1. - Scope and Purpose

COMMENT: Almes & Associates, Inc. (Almes) provided comments to the rule as it relates to coal refuse impoundments and associated sedimentation ponds. Almes pointed out that the West Virginia Surface Mine Regulations require coal related dams to be designed to comply with the Dam Safety Regulations. Consequently, Almes submitted specific comments concerning coal related dams.

RESPONSE: The DEP Office of Water Resources, Dam Safety Section regulates non-coal related dams. The proposed regulations specifically state in subsection 1.1. that the scope of this rule does not extend to those dams that are related to coal activities. No intra-agency agreements or rules exist that provide for adoption of non-coal regulations for application to coal related dams. Consequently, responses to the specific Almes comments cannot be provided in this summary because the Dam Safety regulations, as proposed, do not apply to coal activities.

subsection 2.5. - definition of "average time headway"

COMMENT: Terra Engineers, Inc. (Terra) asked if the definition of "Average Time Headway" in subsection 2.5 should read "the average increment of time between vehicles..."

The Maple Lake Club, Inc. (Maple) stated that the definitions of "Average Time Heading" and "an average day" are far too vague and may not have been calculated by anyone yet. Maple urged retention of the West Virginia Division of Highways (WVDOH) route designations, if the terms remain in the text.

The West Virginia Manufacturers Association (WVMA) stated that applicants for a certificate would be required to perform a specific study of the "average time headway between vehicles" for all routes within the failure inundation area. WVMA said that traffic patterns do not work in a way that allows accurate prediction of when a motorist may be present on a highway. Without direction from the regulations, applicants would have to study driveways and private roads in addition to public highways and trespass on private land. WVMA wrote that the present "primary" and "secondary" highway designations better serve to quantify the risk to motorists. WVMA said the only practical difference between use of current highway designations and those proposed in the regulations is the cost to an applicant for analyses of a potentially unlimited spectrum of routes and the effort the DEP must make to review the analyses.

RESPONSE: Determination of headway is a simple, straightforward calculation that can be accomplished using existing data. DEP consulted with the West Virginia Division of Highways (WVDOH) concerning the calculation of the "average time headway" prior to

drafting the definition. The "average time headway" is a term in common use with highway statisticians. WVDOH conducts a survey covering one third of the state on a revolving basis each year to measure average daily traffic flow on state highways. The results are published annually in a series of maps titled "Traffic Count Maps" available at low cost from WVDOH. The maps include the average daily traffic count values necessary to easily calculate the average time headway without independent study cost or trespass upon private land. Where number values are not available, WVDOH has studied and computed an average value based upon the number of households upon a given road that may be used in determining the headway. Use of the WVDOH values is acceptable to DEP for determining headway. DEP, however, agrees with commentors that the definition may be stated more simply and will re-define the "average time headway" as: "means the number of seconds in one day divided by the average daily traffic."

paragraph 2.10.3. - exemption for "slack water dams"

COMMENT: The West Virginia Manufacturers Association (WVMA) commented that the exemption for "slack water dams" has been deleted from the statute and should also be removed from the regulations.

RESPONSE: DEP agrees with the commentor and will delete paragraph 2.10.3.

subsection 2.10.5. - exemption for structures not normally impounding water

COMMENT: Terra Engineers, Inc. (Terra) commented that "...similar conveyance or such capacity..." should be "...similar conveyance of such capacity..."

RESPONSE: DEP agrees with the commentor that the original intent of the statement was probably "of" rather than "or." The word "or," however, is in the statute and cannot be changed by the regulation.

paragraphs 2.12.2. and 2.12.3. - definition of "dangerous condition"

COMMENT: Terra Engineers, Inc. (Terra) stated that "significant harm to the environment" is redundant in the text since harm to the environment is not significant unless it causes "harm to the public health or welfare."

RESPONSE: DEP understands the circular nature of Terra's argument; however, DEP will retain the wording in the final rule. Although the public welfare and harm to the environment appear equal in this context, if an enforcement action is taken to alleviate a strictly environmental hazard, the wording provides a stronger basis upon

which to proceed.

subsections 2.24 and 2.30. - definitions of high and low risk highways

COMMENT: The West Virginia Manufacturers Association (WVMA) stated that the definitions do not provide any benefit to public safety beyond that afforded by the current definitions of primary and secondary highways. WVMA remarked that the regulations assume danger to motorists will pass when overtopping of a highway has ceased, thus ignoring latent dangers such as debris on the highway or highway embankment slides. WVMA presumed that, by their nature, primary highways will have more traffic than secondary highways and such commonly used terms are readily identified by the applicant and DEP. WVMA stated that the only practical difference between the proposed and existing terms will be the cost to the applicant to study downstream highways. WVMA recommended retention of the primary and secondary highway definitions.

RESPONSE: DEP disagrees with the commentor that the proposed definitions provide no increased benefit to public safety. Discussions with the West Virginia Division of Highways (WVDOH) revealed that traffic volume on secondary highways often exceeds that of primary highways. WVDOH documents this conclusion through the use of traffic count maps based upon actual traffic counts of primary and secondary designated highways. In order to accurately determine the traffic flow on a given highway below a dam, DEP believes the ongoing traffic study provided by WVDOH constitutes the best available information for protection of public safety. DEP also believes that it is not possible to predict before a dam fails if debris will remain on a highway, or the amount of damage to the highway due to overtopping, or if a driver may drive into deep water due to the alignment of the road, or if night conditions will alter a driver's perception of water flow crossing the road. The WVDOH documented traffic study provides the only readily quantified factor that DEP has found upon which to base a conclusion concerning public safety on highways. DEP believes the definitions of high and low risk highways provide a logical and reproducible method for determining public safety on highways and better reflects the actual danger to citizens than the present highway definitions.

subsection 2.30. - definition of "low risk highway"

COMMENT: The West Virginia Manufacturers Association (WVMA) generally objected to the term "low risk highway." The term, as used in the hazard classification of a Class 2 dam, is more restrictive than the present use of "secondary highway" in the present Class B designation and will result in an increase in the number of Class 1 dams.

RESPONSE: DEP believes that the definitions of high and low risk highways represent a reasonable and a more accurate method of determining the risk to public safety than the present definitions. If the proposed definitions result in an increase in the number of Class 1 dams, DEP believes that increase represents a corresponding benefit to public safety.

subsection 2.31. - definition of "major damage"

COMMENT: The West Virginia Manufacturers Association (WVMA) objected to the use of the terms "major" and "minor" damage as speculative with respect to future damages and as imposing greater costs on the regulated community without affording any real benefit to public safety. WVMA asserted that the definition of "major damage" is overly broad and will result in an undue increase in the number of Class 1 dams. WVMA stated difficulty in imagining a downstream area where any building, power pole or underground utility will not be affected by a dam failure. WVMA remarked that, basements of buildings, even if the building is abandoned, will experience major damage if water depth in the basement exceeds 1.5 feet according to the regulations. WVMA suggests removal of the last sentences of subsection 2.31 and deletion of paragraphs 2.31.1 through 2.31.3 to clarify that significant destruction is required, not just basement flooding. If the suggestion is rejected, WVMA recommends that the critical phrase "path of the dam flood wave" should be clarified. The definition should exclude damage to unoccupied or abandoned buildings, and the phrase "above ground" should be placed before "floor elevation of the dwelling" (to avoid inequitable results in the case of basements).

RESPONSE: DEP agrees with WVMA in the difficulty of envisioning a downstream area where some power pole, lift station, or gas line will not be affected as a result of dam failure. In the case of utilities, it is not the intent of DEP to consider every power pole as sufficient cause to trigger Class 1 conditions. On the other hand, it is equally difficult to state with precision the difference between one power pole and a critical electrical substation, except to use the undefined term "important public utilities" in the subsection.

In the case of buildings and basements, it is also not the intent of DEP to consider 1.5 feet of flooding in an abandoned basement as sufficient cause to determine Class 1 conditions. However, DEP also recognizes the possibility that the basement of a building can be full of expensive items or contain living quarters where flooding of 1.5 feet may constitute major damage. Such a situation will not be addressed if the phrase "above ground" is utilized to exclude all basements as suggested by WVMA. DEP does not believe that a balance between the two extremes can be achieved within the text of the regulations. It appears that the best solution to the problem is through the hazard evaluation of the

downstream area. Abandoned buildings are generally easy to recognize and discount in the evaluation. Dwellings, or commercial or industrial buildings should be handled on a site specific basis to permit flexibility for the applicant and DEP.

WVMA's primary recommendation is removal of selected text as stated above in the comment. Removal of the selected text will also remove the critical guidance needed by applicants, consulting engineers and DEP in resolving the question of what constitutes major damage. DEP does not believe the wording that will remain after the recommended deletions provides any guidance beyond what is available in the present regulations, and as such, will be completely ineffective in resolving the meaning of major damage.

WVMA's second recommendation is: 1) to clarify the phrase "path of the flood wave," exclude damage to unoccupied or abandoned buildings, and 2) to add the phrase "above ground" to avoid the difficulty posed by basements. DEP believes that dam break analyses performed as part of risk assessment will define the direct path of the flood wave in a much more accurate and site specific manner than can be attempted in a rule definition. The questions of abandoned buildings and use of the phrase "above ground" are covered in the above discussion and will not be added to the regulations by DEP. DEP will amend the term "utilities" to "important public utilities" to clarify that a utility must be more than a single power pole.

paragraph 2.31.2. definition of "major damage"

COMMENT: Terra Engineers, Inc. (Terra) recommended: "...or bridges are harmed..." should be "...or bridges will be harmed..."

RESPONSE: DEP agrees with the commentor and will change subsection 2.31., in part, to read: "...or bridges will be harmed..."

subsection 2.34. - definition of "minor damage"

COMMENT: The West Virginia Manufacturers Association (WVMA) stated that the regulations require that an owner must show in a hazard evaluation that potential damages will not be major. WVMA remarked that proving a negative is a nearly impossible position for the applicant.

RESPONSE: DEP found no better way to express the concept of "minor damage" during the staff's discussion of the rule text and does not believe the concept is difficult to prove under applicable site conditions. DEP believes that minor damage can be proven as a negative through a demonstration that flooding of a building will not exceed 1.5 feet, or that a building is in a tributary valley out of the direct path of the flood wave, or that flooding of an

important public utility will be less than the elevation needed to short out electrical equipment. In the absence of a viable alternative definition from commentors, DEP will retain the present definition of minor damage.

subsection 2.48. - definition of "significant harm to the environment"

COMMENT: Terra Engineers, Inc. (Terra) stated "...alteration of habitat that adversely affects wildlife..." is an extremely broad statement that can result in various degrees of interpretation. Terra asked to what extent an effect must be to become "adverse." Terra also asked if all forms of wildlife such as field mice and minnows are to be included.

RESPONSE: DEP is unable to provide a better, or more narrow, definition. Terra did not elaborate with examples of the possible degrees of interpretation or a recommended limit within which to define "adverse." DEP believes that this is a difficult issue. DEP will retain the wording in the final rule.

paragraph 3.5.2. - hazard classifications

COMMENT: The Maple Lake Club, Inc. (Maple) stated that the hazard classifications do not conform to those as set out in the 1993-94 legislature. Maple asked why DEP changed the hazard classifications to four categories. In assuming that the proposed rules are modelled after Virginia's regulations, Maple asked DEP to explain why the categories are not further broken down by size of dam. Maple argued that dam size subcategories would remove subjectivity from storm requirements and limit the power and discretion of the director, which now amounts to "Millions of Dollars."

RESPONSE: It is DEP's obligation to propose rules to the legislature that the agency believes will better fulfill the intent and purpose of the Act in protecting the lives and property of state citizens. The fourth hazard classification, as worded in the proposed rule, is to provide a classification allowing reduced design requirements where a dam can be demonstrated to have a minimal effect should it fail. The proposed regulations are purposely not intended to be modeled after Virginia's regulations. The Virginia regulations cover a different and larger statistical population of dams distributed over a larger, more varied geographical area. Virginia dams are, on the average, larger than West Virginia dams (hence the size categories in Virginia's rules) with many differing terrain and site conditions from those found in West Virginia. DEP doubts that the State of Virginia would agree to adoption of West Virginia's regulations for the same reasons.

COMMENT: The West Virginia Manufacturers Association (WVMA)

commented about the hazard classification in combination with the use of the terms major damage, minor damage, high risk highways, and low risk highways. WVMA specific comments and DEP responses to those comments may be found in appropriate sections of the summary. Where WVMA commented directly about the hazard classification language, objections centered around perceived inconsistencies with current regulations. WVMA said that the proposed Class 2 classification is supposed to equate to the present Class B classification; however, WVMA asserts that the proposed wording will not accomplish that end. WVMA recommended retention of the existing Class B wording and associated definitions. For Class 3 dams, WVMA endorses the proposed wording as consistent with the current Class A classification, providing associated definitions are retained. WVMA commended and endorsed the proposal to add Class 4 dams to the classification system as providing increased flexibility where risk is negligible.

RESPONSE: DEP does intend for dams presently assigned the Class B designation to become Class 2 designation. The current hazard classification wording of Class B dams has caused confusion in terms of how to determine what is an "isolated home" or how much (or little) damage may be allowed to the isolated home(s), or what constitutes "interruption of public utility services." The proposed Class 2 designation provides definitive guidance to applicants, consulting engineers and DEP in determining what constitutes allowable damage limits through the defined terms of major damage, minor damage, high risk highway and low risk highway. As a result, DEP will not, in the absence of a better alternative from commentors, retain the current Class B wording.

Under the proposed rule, DEP also intends for the present Class A dams to become Class 3 dams. DEP is pleased that WVMA endorses the proposed wording for the Class 3 designation, but will not remove the associated defined terms as urged by WVMA for the reasons stated above.

subparagraph 3.5.3.a. - hazard evaluation

COMMENT: Terra Engineers, Inc. (Terra) commented that "sudden flooding" is an important consideration due to a possible range of water depth from inches to feet. Terra suggested an amendment to read "a sudden flooding of inhabited land accompanied by..." Terra also urged the DEP to define "damaging velocity" and "wall of water."

RESPONSE: DEP agrees that the phrase "accompanied by" will increase the descriptive effect of the subparagraph and will add the phrase. DEP does not believe that it is possible to capture the essence of "damaging velocity" in a formal definition. The velocity of water necessary to damage a brick building, for example, is different from the velocity necessary to damage a house trailer that is not

tied down. A wall of water is equally difficult to define in a formal or numerical context. DEP intends these terms to be descriptive rather than definitive and, as a result, will not attempt to define the terms.

subparagraph 3.5.3.d. - upstream construction below top of dam elevation or within spillway areas

COMMENT: The West Virginia Manufacturers Association (WVMA) objected to the provision as not authorized by the statute. WVMA maintained the provision will result in litigation regarding unconstitutional "taking" of property without compensation. WVMA believed that DEP will incur greater cost when determinations must be completed under the Private Property Protection Act prior to any action under the subparagraph. In addition, WVMA asserted that the provision will render some of the most desirable locations for commercial development unusable and will harm the state's economic interests. WVMA recommends that the subparagraph be omitted from the final rule.

RESPONSE: DEP agrees with the commentor despite some reservations, and will delete the subparagraph from the final rule.

paragraph 3.5.4. - risk assessment

COMMENT: The Maple Lake Club, Inc. (Maple) stated that dams completed before July 1, 1973, should be "grandfathered."

RESPONSE: A requirement to "grandfather" certain dams is always attractive to the specific owners affected by the rule, but is difficult to justify under the statute intent and purpose to protect life and property. If asked, persons living downstream are likely to be equally adamant that the dams should be regulated as a matter of public safety. Generally, dams existing on July 1, 1973, comprise the majority of DEP's major enforcement problems and the greatest threat to public safety. The Act provides no distinction for existing dams in the legislative intent and purpose to protect lives and private and public property from the danger of a potential or actual dam failure. Section 11 of the Act does specifically address dams existing prior to July 1, 1973, with the requirement that DEP issue notices to the owners and requires tests at owners' expense as necessary to determine the safety of the dam. Given the wording of the Act and the legal liability faced by DEP as a consequence of that wording, DEP cannot grandfather the requested dams in the rule.

COMMENT: The Rock Lake Corporation (Rock) and Lake Floyd Club, Inc. (Floyd) requested that the following sentence be added: "An engineering evaluation of Low Risk (Class III-IV) Dams completed before July 1, 1973, and their downstream areas will not be required."

RESPONSE: DEP believes that the wording recommended by Rock and Floyd is in direct conflict with section 11 of the Act that requires tests at owners' expense as necessary to determine the safety of the dam. As a result, DEP cannot include the requested wording in the final rule.

COMMENT: Terra Engineers, Inc. (Terra) suggested addition of a final sentence to subparagraph 3.5.3.a. to read: "Risk assessment in accordance with paragraph 3.5.4. of this rule may be proposed to reduce the hazard class where applicable."

RESPONSE: DEP agrees that clarification of where risk assessment may be utilized to determine the hazard classification is beneficial, however, it appears that paragraph 3.5.4. is the best location to accomplish it. DEP will revise the first sentence of paragraph 3.5.4. to read: "The applicant may propose a risk assessment according to the following provisions to determine the affect upon dwellings or other buildings downstream (subparagraph 3.5.4.a. of this rule), to reduce the hazard classification (paragraph 3.5.2. of this rule) or to reduce the design storm requirements (subparagraph 7.1.1.b. of this rule) based upon failure of the dam by overtopping.

COMMENT: The West Virginia Manufacturers Association (WVMA) endorsed and supported the proposal to allow reduction of hazard classification or storm requirements by means of an appropriate risk assessment. However, WVMA believes the requirement to "demonstrate that the potential for loss of human life resulting from the dam failure is not significantly increased from that which occurs immediately prior to dam failure" is unclear and may lead to misinterpretation and inconsistent enforcement. WVMA recommends that, if the intent of the phrase is to ensure that risk to human life will not be increased where a hazard reduction or reduced design storm is approved, then the last sentences of subparagraphs 3.5.4.a. and 3.5.4.b. should be revised to read: "The applicant must also demonstrate that the potential for loss of human life resulting from dam failure will not significantly increase if the reduction is granted." In order to add predictability to the merits of a proposal to reduce classification or requirements, WVMA recommends revision of paragraph 3.5.4. to include a definition of "significantly increase" through a new subparagraph 3.5.4.c. to read: "For purposes of subsections 3.5.4.a. and 3.5.4.b. of this rule, the potential for loss of human life will be considered to 'significantly increase' if there would be a more than fifteen percent (15%) rise in the potential loss of human life over that which is projected if the reduction is not granted."

RESPONSE: The phrase "the potential for loss of human life resulting from the dam failure is not significantly increased from that which occurs immediately prior to dam failure" originated with the National Dam Inspection Program conducted by the Corps of Engineers. The wording was intended to address the possibility that

persons downstream may be forced from their homes by flood water prior to the failure of the dam. DEP has retained this wording in the proposed rule as the best available phrase to describe the basis and rationale of risk analysis. The phrase is employed in subparagraphs 3.5.4.a. and 3.5.4.b. to ensure that the design storm or hazard classification reduction proposed by the applicant will not have the consequence of causing loss of human life. DEP will retain the proposed phrase in the final rule because it is a nationally recognized wording regarding risk assessment and accomplishes the same purpose as the wording proposed by WVMA.

WVMA also recommended addition of a phrase defining "significant increase" as a fifteen (15%) percent rise in the potential for loss of life over that which is projected if a reduction is not granted. DEP believes this phrase will raise more problems than it solves and cause the applicant increased cost through the engineering and legal questions raised. A fifteen percent increase is not hard to contemplate as a numerical limit; however, coupling a precise numerical limit with such a slippery and difficult to quantify concept as the potential for loss of human life creates a problem. The problem is how to calculate fifteen percent of any number of human lives in engineering, legal and human contexts. DEP believes that, in this case, it is better for the public, the applicant and DEP to retain the proposed flexible wording in the final rule without attempting to define such a difficult concept.

paragraph 6.4.6. - erosion and sediment control

COMMENT: The West Virginia Manufacturers Association (WVMA) stated that the three acre provision of NDPES stormwater construction permits may change in the future to the five acre disturbance limit of the federal permit. WVMA suggests deletion of the three acre reference in subparagraphs 6.4.6.a. and 6.4.6.b.

RESPONSE: DEP agrees with the commentor and will remove the reference to three acres in the subparagraphs.

subparagraph 7.1.1.b. - design storm requirements

COMMENT: The Maple Lake Club, Inc. (Maple) commented that the design storm requirements do not conform to those as set out in the 1993-94 legislature.

RESPONSE: Maple is correct. It is DEP's obligation to propose rules to the legislature that the agency believes will better fulfill the intent and purpose of the Act in protecting the lives and property of state citizens.

COMMENT: The West Virginia Manufacturers Association (WVMA)

endorsed amendments to the Class 1 storm requirements insofar as greater flexibility will be allowed. However, WVMA states that the lower limit of the Class 2 design storm (25 percent of a 6 hour PMP) is more stringent than the 100 year, 6 hour storm in the present regulations. According to WVMA, no changes to the Act required this change. WVMA maintained that the existing provision regarding the magnitude of the design storm closely relate to anticipated damage is protective of public safety without the extra step of a risk analysis. The applicant will incur expense and delay associated with risk analysis. In addition, WVMA questioned the effect on the certificate extension of approved dams when the storm criteria are changed. WVMA stated that such dam owners should not be required to meet the changed storm requirement before gaining certificate extensions. Therefore, WVMA recommended retention of existing Class B storm requirements. WVMA also objected to an increase of Class 3 storm requirements above current Class A requirements. WVMA requested clarification on the application and impact of the changes to existing Class A dams and recommended retention of the current design storm requirement. For Class 4 dams, WVMA recommended revision of the design storm requirements to a range from a minimum P100 storm of 4 hours duration to a maximum P100 storm of 6 hours duration.

U.S. Soil Conservation Service (SCS) pointed out that the terms "probable maximum precipitation" and "probable maximum precipitation storm" are not interchangeable. All subparagraphs need a storm distribution. SCS commented that the hydrologic criteria has been effectively increased. The increase appears to be an arbitrary change that may or may not be necessary; however, the result will be an increase in complexity and size of these dams. Severity of damage downstream could increase should one of these dams fail. A storm distribution is not defined in part 7.1.1.b.D. (Class 4). SCS believes many small dams could function satisfactorily under less stringent criteria, for example sediment ponds, runoff retention structures.

Triad Engineering Consultants, Inc. (Triad) recommended in oral comments that the design storm requirements should be increased in flexibility to allow incremental design storms equal to that necessary to protect human life. Triad stated that, if the spillway discharge will flood persons downstream at the 35 percent PMP storm, that the 35 percent storm should be the design storm requirement. Triad expressed agreement with the sunny day failure scenario, but that the sunny day condition should only impact stability requirements, not spillway design requirements.

RESPONSE: DEP points out that the 1993 legislature changed the storm requirements at the request of a small special interest group of dam owners <u>without</u> amendment to the Act. DEP believes that proposed regulations are necessary to clarify the 1993 legislative changes and do not require amendment of the Act.

WVMA stated that the storm requirement changes are more stringent than present requirements. SCS stated that the requirements have effectively increased. DEP provides the following list of design storms for ready reference to clarify the base storms used in the discussion below (all values are in inches of rainfall within a six hour duration applicable to a typical West Virginia location):

| | |
|---|---|
| Probable Maximum Precipitation (PMP) | = 27.50 |
| 70% Probable Maximum Precipitation | = 19.25 |
| 50% Probable Maximum Precipitation | = 13.75 |
| 25% Probable Maximum Precipitation | = 6.87 |
| 100 year storm (P100) | = 4.50 |

Using the above reference storms, DEP offers comparisons of design storm requirements past, present and proposed:

Past design storms in use from 1973 until 1993 were as follows:

| | |
|---|---|
| Class C design storm - PMP | = 27.50 |
| Class B design storm - P100 + 0.40(PMP - P100) | = 13.70 |
| Class A design storm - P100 + 0.12(PMP - P100) | = 7.26 |

The 1993 legislature changed the design storm to the present requirements of:

| | | |
|---|---|---|
| Class C design storm - PMP | | = 27.50 |
| Class B design storm - range: | 50% PMP | = 13.75 |
| to : | 100 year storm | = 4.50 |
| Class A design storm - 100 year storm | | = 4.50 |

DEP proposed the following design storm requirements in this rule:

| | | |
|---|---|---|
| Class 1 design storm - range: | PMP | = 27.50 |
| to : | 70% PMP | = 19.25 |
| Class 2 design storm - range: | 50% PMP | = 13.75 |
| to : | 25% PMP | = 6.87 |
| Class 3 design storm - 25% PMP | | = 6.87 |
| Class 4 design storm - 100 year storm | | = 4.50 |

Using the above tables as a guide, DEP believes commentors may readily see that DEP is proposing design storm requirements with greatly increased flexibility from those in use from 1973 until 1993 and with increased flexibility from those in effect presently. Several commentors have remarked that the increased flexibility represented by these requirements is a welcome development. Of the design storm requirements in the present and proposed requirement tables, the proposed rule increases the lower limit of the requirement for Class 2 dams and the requirement for Class 3 dams. These two increases provide for a meaningful distinction between requirements for Class 2 versus Class 3 and Class 4 dams. It also reflects a necessary margin of safety above the 100 year storm - a

storm that is very likely to occur or be exceeded during the life of a Class 2 dam with resulting major damage to property if the dam fails. DEP does not consider these increases to be dramatic or an effective increase, especially viewed in light of previous requirements. The other design storm requirements remain the same or are reduced through the flexibility of an expanded risk assessment in the proposed rule.

WVMA asserted that risk assessment for design storms will be expensive and will delay the applicant. DEP points out that performance of risk assessment to determine a design storm below the maximum value of the range is entirely optional. The applicant may chose to design the dam for the maximum storm value (as the requirement existed since 1973) of the range without performing any design storm risk assessment. However, most applicants may find that the design delay and expense of risk assessment is more than offset by the savings in construction cost of larger spillways. The present rules for Class B dams provide the phrase "magnitude of storm must closely relate to the degree of anticipated damage downstream based upon information supplied to the Director." This phrase provides none of the guidance for risk assessment that is included in the proposed rule for the applicant, the consulting engineer and for DEP. DEP knows of no better information upon which to decide the design storm for present Class B dams than that which can be provided through a risk analysis. Therefore, under both the present and proposed rules, the applicant who wishes to design for a storm less than the maximum value will be faced with performance of risk analysis. DEP believes the difference for all concerned is the expanded guidance provided in subparagraph 7.1.1.b. of the proposed rule versus the minimal guidance of the present rule.

WVMA questioned the effect upon existing dams holding certificates of approval and stated that such dams should not be required to be upgraded due to changed design storm requirements. The tables provided above show that existing dams with certificates will meet or exceed the proposed storm requirements and will not be an issue. DEP has reviewed the state inventory of dams as a result of the comment and found that there are no dams approved since the 1993 legislative change that will be affected by the issue. Review of pending applications found no applications that could be approved prior to the effective date of the proposed rule with this issue. Therefore, DEP concludes that this particular comment, although a valid concern, has no practical basis for revision of the rule.

WVMA also recommended revision of the design storm requirement for Class 4 dams to a range between the P100 of six hours duration and P100 of four hours duration. DEP does not believe WVMA appreciates the effect of this proposal. If the proposed range were adopted, applicants will find that decreasing the duration of the design storm will reduce the volume of water generated by the storm, but increases the peak inflow into the

reservoir and may require a larger spillway size. Further, existing design storms are based upon families of synthetic unit hydrographs of which the six hour duration storm is the shortest duration family. The applicant will be faced with the complex task of developing a non-standard duration synthetic hydrograph, or determining the hydrograph by transposing information from the nearest gaged streams. West Virginia has very few gaged streams upon which to draw information making this method a limited option. DEP will be faced with increased review time resulting in delays for the applicant. DEP concludes it is in the best interests of the applicant, consulting engineers and DEP to retain the proposed six hour duration storm requirements as the most cost effective for all concerned.

DEP agrees with SCS concerning the term probable maximum precipitation and will use the defined term "probable maximum precipitation" throughout the subparagraph. The issue of storm distribution is more difficult. Peak runoff from the storm is influenced by the distribution of rainfall through the duration of the storm. Several theories exist concerning types of rainfall distribution during storms and the resulting runoff from those distributions. DEP is open to submission of different types of storm distribution depending upon the intent of the design engineer and standard engineering practice. As a result, DEP will not limit the storm requirements to any one type of distribution.

As discussed above, DEP concludes that the design storm requirements proposed in the rule will not result in dams of increased size or complexity as asserted by SCS. Therefore, DEP does not agree that severity of damage downstream could increase as a result of a dam failure under the proposed rule requirements.

SCS commented that many small dams could function satisfactorily under less stringent criteria and includes sediment ponds and runoff retention ponds as examples. DEP points out that the vast majority of small dams used for sediment control and runoff retention are smaller than jurisdiction size and have no requirements under these rules. For structures meeting jurisdiction limits, DEP does not differentiate dams based upon their purpose (with the exceptions of waste disposal and coal-related dams), or size. DEP believes that failure of any small high hazard potential dam meeting the legal jurisdiction size may kill people just as dead as a larger dam, or a dam with a different purpose. Therefore, DEP concludes that small dams capable of killing people must meet the same requirements as dams of a larger size or of a different purpose.

DEP does not agree with the Triad argument that the design storm requirement should be equal to the spillway discharge that will just flood out persons downstream. A margin of safety guards against the very likely event that most downstream areas will change in the future. If new houses are constructed

downstream, the dam owner may be faced with the cost of a completely new hazard analysis to determine the risk to the new house(s) under the Triad argument. DEP believes that the proposed design storm requirements provide an adequate margin of safety against downstream development and will protect the dam owner's investment in the original risk assessment.

part 7.1.2.a.A. - storage and discharge

COMMENT: U.S. Soil Conservation Service (SCS) asked if this part of the rule includes Class 4 dams.

RESPONSE: DEP does not propose storage and discharge requirements for Class 4 dams due to the variability of dams anticipated in this classification.

subparts 7.1.2.c.A.(b) - principal spillway or decant only waste disposal dams and 7.1.2.c.A.(c) - no outlet works waste disposal dams

COMMENT: The West Virginia Manufacturers Association (WVMA) opposed the prohibition of risk assessment use for waste disposal dams. WVMA asserted that there is no reason why applicants for waste disposal dams should not be allowed the flexibility of risk assessment, provided the applicant can show that methods of removing accumulated water from the reservoir are sufficient to maintain dam integrity during the storm event. WVMA recommends the risk assessment prohibition be omitted from the final rule.

RESPONSE: In addition to the physical hazard presented by a possible dam failure, waste disposal dams are also environmentally hazardous structures. The Buffalo Creek disaster caused increased loss of life due to the presence of waste materials in the flood water. DEP believes the additional margin of safety against failure provided by the upper design storm limits are necessary to protect against the physical and environmental potential damage posed by waste disposal dams.

part 7.4.2.a.B. - seepage and piping control

COMMENT: The Maple Lake Club, Inc. (Maple) asked whether this part of the rule could be imposed on existing dams.

RESPONSE: This part may be required for existing dams where evaluation of the dam indicates that the embankment is prone to piping failure. Piping problems are the cause of approximately fifty percent of dam failures and may be prevented through appropriate seepage and piping control measures.

subpart 7.4.2.a.D.(a) - embankment safety factors

COMMENT: U.S. Soil Conservation Service (SCS) recommended that DEP clarify to which upstream or downstream embankment side slope(s) this subpart applies, or to note that both slopes are subject to a given sub-paragraph. SCS asked the following questions: "What actual soils data is required? What types of tests are required to determine appropriate stress values? When should total stress values be used and when should effective stress values be used?"

RESPONSE: DEP agrees with the commentor regarding the side slope issue and will add the following sentence to the end of the subpart: "Unless otherwise indicated, factors of safety requirements apply to both upstream and downstream slopes of the embankment:" Item 7.4.2.a.D.(a)(C) will be amended to read: "An upstream slope rapid drawdown safety factor of 1.3;"

DEP directs the commentor to item 7.4.2.a.D.(d)(B) for actual soils data required. Types of testing to determine appropriate stress values are specific to the applicable soils involved and the conditions anticipated in the design. DEP believes that a listing of all possible combinations of soil types and possible tests applicable to confined versus unconfined or drained versus undrained condition testing is the arena of textbooks. A listing of all of the possible combinations of soils in West Virginia versus testing requirements is an impossible task. DEP believes that necessary testing, and determination of when effective or total stress values are applicable, are the prerogative of the design engineer with review by the agency. As a result, DEP will not alter wording of the subpart based upon these questions.

subpart 7.4.2.a.D.(c) - embankment loading conditions

COMMENT: Terra Engineers, Inc. (Terra) suggested the subpart be amended to read: "Embankment Loading Conditions -- Loading conditions shall assume a long-term steady-state condition with the phreatic surface based upon the maximum water level estimated from a transient seepage analysis, or alternatively, with the phreatic surface originating at the elevation of the emergency spillway crest for embankment dams with emergency spillways or at a maximum design pool elevation for embankment dams without spillways."

U.S. Soil Conservation Service (SCS) stated that the phreatic surface should begin at the elevation of the crest of the principal spillway because the water level will never be at the crest of the emergency spillway long enough to have any significant effect on the phreatic line.

RESPONSE: DEP has experienced situations with dams on Harmon Creek, Berwind Lake and others where clogging or failure of the principal spillway/drain system raised the reservoir elevation to the level of the emergency spillway for long periods of time. DEP believes

this requirement is necessary to guard against the possibility of principal spillway failure and the possible long term deleterious effects of reservoirs at emergency spillway levels.

subpart 7.4.2.B.(b) - gravity dam stability

COMMENT: Terra Engineers, Inc. (Terra) recommended that the term "three dimensional analyses" be clarified.

RESPONSE: DEP agrees with the commentor that the subpart should be clarified. The subpart will be amended to read "...three dimensional analyses of foundation strength based upon..."

subpart 7.4.2.d.A.(c) - gated drain pipe required for new freshwater dams

COMMENT: Terra Engineers, Inc. (Terra) commented that the term "normal base flow" needs to be defined since this must be considered in the design of the drain system.

RESPONSE: In DEP's experience, the normal base flow in West Virginia is approximately 1.0 to 1.2 cubic feet per second per square mile. Definition of normal base flow is difficult due to the variability of watershed conditions, groundwater hydrology, and seasonal rainfall. The relatively small watershed size common in West Virginia makes the contribution of base flow to the capacity of most drain systems minor. DEP will leave the term normal base flow undefined for these reasons.

subpart 7.4.2.d.A.(d) - existing dams with gated drainpipes

COMMENT: The Maple Lake Club, Inc. (Maple) asked if this subpart was written with the sole intent of regulating Maple.

The Rock Lake Corporation (Rock) and Lake Floyd Club, Inc. (Floyd) requested addition of the following sentence: "Valves on low risk dams completed prior to July 1, 1973, will not be subject to relocation."

RESPONSE: DEP proposes this subpart in order to repair existing dams that have drain pipes, but do not have a gate or valve at the upstream end of the pipe. A number of existing dams statewide are in this condition. Experience has demonstrated to DEP that dams without an upstream valve have a drain pipe through the embankment that is under constant reservoir pressure. If the pipe ruptures or develops leakage at joints, the dam owner has no means to cut off the water flow. As a result, the embankment may be in danger of high phreatic levels, instability, internal erosion and collapse. The owner can prevent this possibility through addition of an

upstream valve to cut off flow through the pipe, thereby protecting the owner's liability and increasing public safety. DEP points out that the vast majority of dams with the problem of upstream valves were designed and built prior to July 1, 1973. As a result, the sentence requested by Rock and Floyd will not be included in the final rule.

COMMENT: The West Virginia Manufacturers Association (WVMA) stated that the requirement for existing dam owners to install upstream valves on drain pipes will cost dam owners significant, unforeseen expense. This harsh effect is not mitigated by the provision for a time extension where installation of a valve may cause major economic loss to the owner. The subpart may abridge the constitutional prohibition on ex-post facto laws, especially due to the possible criminal penalties in the Act. To ensure constitutionality, WVMA recommended removal of the subpart from the final rule.

RESPONSE: DEP appreciates the WVMA viewpoint that dam owners may be caused significant expense due to this requirement, but the expense should not be unforeseen. The valid problems of possible reservoir draining and the need to marshall financial resources was the purpose behind the provision to approve delay in installation of the drain. Providing the existing drain is functioning properly, the rule places no time limit upon the delay. DEP does not agree that such a delay, negotiated between the owner and DEP, will be harsh. If the existing drain is not functioning properly, the matter is one of public safety that must be addressed in a timely manner (see response to previous comment). DEP does not agree with WVMA's objection based upon ex-post facto laws relative to criminal penalties. If this provision of the regulations is objectionable due to its application with existing dams, then all of the other specific provisions of the Act and regulations related to existing dams would also appear to be a matter of ex-post facto.

COMMENT: U.S. Soil Conservation Service (SCS) agreed with the need to have gated drain pipes on dams. SCS suggested wording to recognize that addition of a gated drain pipe may not be feasible in all cases and to allow an exemption where unusual conditions warrant.

RESPONSE: DEP agrees that installation of a gated drain pipe may not be feasible in all cases. DEP will add the following sentence to the end of the subpart: <u>The director may grant an exemption to this subpart when investigation of the existing drain system determines to the director's satisfaction that installation of an upstream drain gate or valve is not feasible.</u>

<u>section 13 - dams completed before July 1, 1973</u>

COMMENT: The Maple Lake Club, Inc. (Maple) stated dams whose

performance can be substantiated by historic data should be "grandfathered." Maple also urged addition of a sentence to read: "Stability and flood route analysis will not be required on low risk dams on the basis of historical performance of the dam."

The Rock Lake Corporation (Rock) and Lake Floyd Club, Inc. (Floyd) stated the following sentence should be added to the end of the section: "Stability and flood route analysis will not be required on low risk dams on the basis of historical performance of the dam."

RESPONSE: A requirement to "grandfather" certain dams is always attractive to the specific owners affected by the rule, but is difficult to justify under the statute intent and purpose to protect life and property. If asked, persons living downstream are likely to be equally adamant that the dams should be regulated as a matter of public safety. Generally, dams existing on July 1, 1973, comprise the majority of DEP's major enforcement problems and the greatest threat to public safety. The Act provides no distinction for existing dams in the legislative intent and purpose to protect lives and private and public property from the danger of a potential or actual dam failure. Section 11 of the Act does specifically address dams existing prior to July 1, 1973, with the requirement that DEP issue notices to the owners and requires tests at owners' expense as necessary to determine the safety of the dam. Given the wording of the Act and the legal liability faced by DEP as a consequence of that wording, DEP cannot grandfather the requested dams or waive the requested analyses in the rule.

RESPONSE TO GENERAL COMMENTS:

COMMENT: Maple Lake Club, Inc. (Maple), Rock Lake Corporation (Rock), and Lake Floyd Club, Inc (Floyd) criticized the DEP for failing to hold a hearing in northern West Virginia. Maple and Rock also criticized DEP for not notifying dam owners of the proposed rules.

RESPONSE: The DEP seeks and promotes public participation in the course of the rule-making process. To this end, the proposed rule was publicized in eight state newspapers and in the Division's newsletter, InDEPth. A public hearing was also held in Charleston during evening hours to allow increased participation. Due to lack of widespread public interest and limited DEP resources, additional hearings were not held in other parts of the state.

COMMENT: Maple Lake Club, Inc. (Maple) stated that the agency preamble statement about "guidance" is inaccurate.

RESPONSE: DEP does not agree with the commentor and believes that the proposed wording of the rule provides better guidance for owners, applicants, consulting engineers and DEP in many areas than

the wording which exists in the current regulations.

COMMENT: In emphasizing Rock's great investment of time and money in dam safety compliance, Rock pointed out that the proposed regulations will be punitive unless Rock is "grandfathered" and hoped the regulations will consider works in progress. Rock welcomed the inclusion of Class 4 dams as a step in the right direction.

RESPONSE: A requirement to "grandfather" certain dams is always attractive to the specific owners affected by the rule, but is difficult to justify under the statute intent and purpose to protect life and property. If asked, persons living downstream are likely to be equally adamant that the dams should be regulated as a matter of public safety. Generally, dams existing on July 1, 1973, comprise the majority of DEP's major enforcement problems and the greatest threat to public safety. The Act provides no distinction for existing dams in the legislative intent and purpose to protect lives and private and public property from the danger of a potential or actual dam failure. The Act does specifically address dams existing prior to July 1, 1973, with the requirement that DEP issue notices to the owners and requires tests at owners' expense as necessary to determine the safety of the dam. Given the wording of the Act and the legal liability faced by DEP as a consequence of that wording, DEP cannot grandfather the requested dams in the rule. DEP is pleased that Rock welcomed the Class 4 classification.

COMMENT: U.S. Soil Conservation Service (SCS) stated the proposed regulations will completely change the way hazard classification is "done" and that this total change in hazard designation is a surprise. SCS asserted that the a, b, c system of hazard classification is widely recognized and understood by all users. Change to the classification system seems unnecessary to SCS and addition of a fourth classification is questioned. SCS concluded by strongly recommending reconsideration of the regulations changes as detrimental to building flood prevention and water supply dams in the state. SCS asserts that the hydrologic criteria have been dramatically increased and will result in larger, more expensive dams to the detriment of flood prevention and water supply dam construction.

RESPONSE: DEP does not believe the proposed hazard classification is a "complete" change. Essential consistency of the classification criteria is retained; however, the letter designations have been changed to numerical designations. Although dam safety professionals are comfortable with the a,b, & c classifications, the public and the regulated community often question why Class A is not ranked as the highest hazard possible. The proposed classifications, in DEP's opinion, provide logical continuity for the highest hazard as Class 1 and the lowest as Class 4, without changing the essence of the classification definitions.

The hydrologic criteria from 1973 until 1993 were equal to those of SCS. SCS does not mention in their comments that a change in the regulations by the 1993 legislature relaxed the requirements for Class B and A dams considerably from the SCS criteria. DEP proposes to establish a range of hydrologic requirements for Class 1 and 2 dams with upper limits close to the original SCS hydrologic criteria. Please see the extensive comments and responses the summary relative to subparagraph 7.1.1.b. for a more detailed discussion of the issues. DEP believes that this proposed return to the essential SCS hydrologic criteria (or less) should not be a "dramatic increase" for SCS and should not result in increased size or complexity of dams nor cause increased cost.

COMMENT: Maple found many positive areas demonstrating vision in the proposed regulations and agreed to and supported those areas.

ALMES & ASSOCIATES, INC.
CONSULTING ENGINEERS

RALEIGH COUNTY AIRPORT INDUSTRIAL PARK, 105 PILOT DR., BEAVER, WV 25813
TELE 304/256-0491 FAX 304/256-1232

August 8, 1994

Ms. Rosanna Long
Office of Water Resources
WEST VIRGINIA DIVISION OF
ENVIRONMENTAL PROTECTION
1201 Greenbrier Street
Charleston, WV 25311-1088

Review Comments
Proposed Dam Safety Regulations Amendments

Dear Ms. Long:

This letter describes our comments pertaining to the proposed dam safety regulations amendments. Our comments, presented below, include both existing and proposed regulations. Although our firm has been involved in the design and/or modification of several freshwater impoundments, we routinely design coal refuse disposed impoundments and associated sedimentation ponds. As you know, the West Virginia Surface Mining Regulations require these structures be designed to comply with the Dam Safety Regulations. Our comments reference the appropriate section of the proposed regulations.

Section 3.2.1 - For dam classification purposes, the dam safety regulations require the height of a dam be measured from the downstream toe to the crest. This criterion is more stringent than that required by the Mine Safety and Health Administration, which measures the height of the dam from the upstream toe. Measuring the dam height from the upstream toe is more representative of the impounding capability of the facility, especially in the steep terrain of West Virginia.

Section 7.1.2.c.A(b) - Some flexibility needs to be added for sites that have a decant but cannot meet the 10-day drawdown criteria. In our opinion, the intent of the regulations is satisfied if a second design storm can be stored within 10 days of the first storm, regardless of whether 90 percent of the first storm can be evacuated. Due to the strict interpretation of these guidelines by West Virginia Division of Environmental Protection personnel, we suggest the language in the regulations be changed to permit facilities designed to meet the "intent."

Section 7.2.4.d - A definition of the toe of the dam needs to be included. In our opinion, the toe should be based on the minimum configuration needed to maintain the required (during construction) embankment stability. Although this is usually not a problem with typical fresh water dams and sedimentation ponds, coal refuse disposal facilities can have oversized coarse coal refuse dams with the toe several hundred feet downstream of the impoundment. In our opinion, spillways should be designed to route the storm water flow safely around the "structural" portion of the embankment and not the entire embankment since erosion of the non structural coarse coal refuse would not have a detrimental effect on the main embankment integrity.

Section 7.4.2.d.A.(c) - Need to clarify that the gated drain pipe does not apply to coal refuse impoundments and sediment control structures.

Section 3.5.4(a);(b): A clarification pertaining to the design storm and drainage area to be used to demonstrate the points of interest will be inundated prior to dam failure is needed. Is the design storm considered to only occur upstream of the impounding embankment or upstream of the point of interest? This could result in a significant difference in the channel flood levels.

We appreciate the opportunity to submit these comments. If there are any questions, please contact us.

Respectfully submitted,

ALMES & ASSOCIATES, INC.
CONSULTING ENGINEERS

Frederick R. Vass
Project Manager

FRV:bkb

cc: K.O. Damron

**Rock Lake Corporation**
**Rt. 6 Box 250C**
**Fairmont, WV 26554**

August 1, 1994

Brian Long
Office of Water Resources
1201 Greenbrier Street
Charleston, WV 25311-1088

Dear Mr. Long:

I would like to enter this as part of the written comments for the Proposed Dam Safety Regulations Amendments.

**Section 3.5.4. Risk Assessment**

Add the following sentence at the end of the paragraph:

"An engineering evaluation of Low Risk (Class III-IV) Dams completed before July 1, 1973, and their downstream areas will not be required."

**Section 7.4.2.d.A.(d) Existing Dams with Grated Drain Pipes**

Add the following sentence at the end of the paragraph:

"Valves on low risk dams completed prior to July 1, 1973 will not be subject to relocation."

**Section 47-34-13.1 Dams Completed before July 1, 1973**

Add the following after the second sentence:

"Stability and flood route analysis will not be required on low risk dams on the basis of historical performance of the dam."

My comments are to include this language as it presents an alternative to incurring significant expense to rural lake communities in West Virginia which would be considered low hazard. Currently, our Lake Association is completing the application for certification as a Class B structure on or before December 31, 1994. We have invested a great deal of time and expense getting to this point and it would appear that new regulations would be punitive to our community unless grandfathered since we are currently in the process of certification under the existing law. I would like to enter into the record that Rock Lake has been working toward dam certification for several years now. We have invested a significant amount of time and money into

getting to the place where we are today and I hope that the regulations would consider works in progress, such as ours.

Also, we would welcome a public hearing in North Central West Virginia and are prepared to present expert testimony for these arguments from a professional engineering standpoint. Our task force members include a wide range of professionals, engineers and others knowledgeable in this regard.

There are positive aspects of the regulations which are welcomed, such as the inclusion of a 4th category, addressing rural lakes and normally unoccupied buildings, etc. This is a step in the right direction. The regulations should be cognizant of the needs of rural lake communities which have existed in this state for over 50 years.

I hope you will take these comments seriously. Our Lake Communities Task Force will be closely monitoring developments in this area and are willing to lend our support if mutually agreeable and beneficial regulations can be developed. We also can be available for any testimony required to support the above changes during the legislative session if these regulations are introduced and considered.

Thank you.

Raymond Alvarez

Raymond Alvarez
Rock Lake Board Committee Chairman, Dam certification

cc: Rock Lake Board of Directors
Dam Certification Committee
Delegate Paul Prunty

# *LAKE FLOYD CLUB, INC.*

Route 2 ✦ Bristol, WV 26332

August 6, 1994

Brian Long
Division of Environmental Protection
Office of Water Resources
1201 Greenbrier Street
Charleston, WV 25311

Dear Mr. Long:

I would like to enter this as part of the written comments to the Proposed Dam Safety Regulations Amendments.

1. Fiscal Note For Proposed Rule
   3. We question the need for expanded guidance to so many sections for application of storm requirements enacted by the 1992 Legislature.

Section 3.5.4. Risk Assessment
Add the following sentence at the end of the paragraph:

"An engineering evaluation of Low Risk (Class III-IV) Dams completed before July 1, 1973, and their downstream areas will not be required."

Section 7.4.2.d.A.(d) Existing Dams with Grated Drain Pipes
Add the following sentence at the end of the paragraph:

"Valves on low risk dams completed prior to July 1, 1973 will not be subject to relocation."

Section 47-34-13.1 Dams Completed before July 1, 1973
Add the following after the second sentence:

"Stability and flood route analysis will not be required on low risk dams on the basis of historical performance of the dam."

We would welcome a public hearing in North Central West Virginia and are prepared to present expert testimony for proposed additions from a professional engineering standpoint. Our task force members include a wide range of professionals, engineers and others knowledgeable in this regard.

I respectfully request that these comments be seriously considered. Our Lake Communities Task Force will be closely monitoring developments in this area and are willing to lend our support if mutually agreeable and beneficial regulations are developed.

Thank you in advance for your consideration.

Sincerely,

James L. Reaser
Lake Floyd Board
Committee Chairman
Dam Certification

United States Department of Agriculture
Soil Conservation Service
75 High St. Rm 301
Morgantown, WV 26505

**Date:** August 8, 1994

**Brian R. Long, Assistant Chief**
**Department of Commerce, Labor, and Environmental Resources**
**Division of Natural Resources**
**Water Resources Section**
**1201 Greenbrier Street**
**Charleston, WV 25311**

9

**Re:** Comments on the proposed dam safety regulations

Dear Brian,

Delbert provided me with a set of the proposed changes to the dam safety regulations. Thank you for the opportunity to comment.

All rainfall values cited need to be noted as point data or areal corrected data. Any reference to a storm or rainfall event on pages 5, 20, 21, and 22 need to have a type or distribution designated in order to have proper meaning.

The complete change in hazard classification designation is a surprise. Many agencies, both federal and state, use the "a, b, & c' system. A complete change in hazard system seems to be an unnecessary change which will result in confusion. If a fourth category is needed, it could have been added to the present system, perhaps as a '0' designation, or some other acceptable notation.

Page 20 - paragraph 7.1.1.b - The terms 'probable maximum precipitation' and 'probable maximum precipitation storm' are not interchangeable. All subparagraphs need a storm distribution.

Page 20 & 21 - The hydrologic criteria for class 2 & 3 dams has been effectively increased. This seems to be an arbitrary change that may or may not be necessary. If enacted, this change will result in an increase in complexity and size of these dams. This could actually increase the severity of damage downstream should one of these dams fail.

Page 21 - paragraph 7.1.1.b.D - Storm distribution is not defined. Many small dams could function satisfactorily under less stringent criteria, for example - sediment ponds, runoff retention structures, etc.

Page 21 - paragraph 7.1.2.a.A - Does this include class 4 dams as well?

United States Department of Agriculture
Soil Conservation Service
75 High St. Rm 301
Morgantown, WV 26505

**Date:** August 9, 1994

**David C. Callaghan, Director**
**Division of Environmental Protection**
**10 McJunkin Road**
**Nitro, WV 25143**



**Re:** Comments on the proposed dam safety regulations

Dear Mr. Callaghan:

We were provided with a review copy of the proposed changes to the dam safety regulations. Michael Blaine, our state engineer, has commented directly to Brian Long but since some of the changes are very significant, I have commented to you as well.

The proposed regulations will completely change the way hazard classification is done. This total change in hazard classification designation is a surprise. Many agencies, both federal and state, use the "a, b, & c' system with the same or very similar definitions for each category. The system is recognized widely and understood by all users. A complete change in hazard system seems to be an unnecessary change which will result in confusion. If a fourth category is needed, it could have been added to the present system, perhaps as a '0' designation, or some other acceptable notation. However, we strongly question the need for a fourth category.

The hydrologic criteria for proposed class 2 & 3 (now class a and b) dams has been dramatically increased. This increase in criteria will result in larger, more expensive dams. We believe that this criteria change is completely unwarranted.

We strongly recommend that you reconsider the above proposed changes. We do not see the need to make such changes and believe those changes will be detrimental to building flood prevention and water supply dams in West Virginia.

Thank you for considering our views. If you have questions or need further information, let me know.

Sincerely,

Rollin N. Swank
State Conservationist

Page 28 - paragraph 7.4.2.a.D.(a) - Designate which side slope the criteria applies to, or note that both slopes are subject to a given sub-paragraph. What actual soils data is required? What types of tests are required to determine appropriate stress values? When should total stress values be used and when should effective stress values be used?

Page 28 - paragraph 7.4.2.a.D.(c) - The phreatic surface should begin at the elevation of the crest of the principal spillway, or permanent pool. The water level would never be at the crest of the emergency spillway long enough to have any significant effect on the phreatic line.

Page 31 - paragraph 7.4.2.d.A.(d) - We agree with the need to have gated drainage on dams. It should be recognized, however, that there may be some older dams where the addition of a gated drain is not possible or feasible. I suggest wording be added to allow the director to exempt dams where unusual conditions warrant.

If you have questions or need further information, let me know.

Mike

Michael M. Blaine
State Conservation Engineer

cc:Delbert Shriver
RSwank
PDunn

Division of Environmental Protection
Mr. Brian Long
Office of Water Resources
1201 Greenbrier Street
Charleston, Wv 25311

Dear Mr. Long: August 8, 1994

On behalf of Maple Lake Club, Inc., I am responding to proposed changes to the Dam Safety Regulations, 47 CSR 34, which should be entered as part of the written comments.

It certainly appears that much time, effort and research was expended by Mr. Long for the proposed guidelines, and there are many positive areas in the proposed regs that we agree with and support, and show Mr. Long's vision in this area. However, there are several areas that I would like to address .

First, I would like to express my surprise with the changes and the process. You will recall that I was a member of the Lake Community Task Force that helped ease the burden on small lakes, where if the dam failed, it would not cause the loss of a human life. We believe that by notifying dam owners of the proposed changes, you would have received many comments, on which a comprehensive and lasting reg could be based upon. Secondly, the compromise that was reached with you called for three categories of dams in West Virginia. The proposed regs indicate four. This would indicate that your "Preamble to a Proposed Rule Concerning Dam Safety Regulations", stating that this amendment is for "guidance" is not quite accurate.

I cite specific questions/potential problems with the proposed regs.

1. The definition of "Average Time Heading" and "an average day" are far too vague and may not have been calculated yet. We need to keep the DOH route designations if these terms are kept in the text.

2. Hazard classifications on pages 9 and 10 do not conform to those as set out in the 1993-94 legislature.

3. Design storm requirements do not conform to those as set out in the 1993-94 legislature.

4. On page 27, under Seepage and Piping control, could this section be imposed on existing dams?

5. On page 31, existing dams with gated valves, this would seem to be directed at Maple Lake Club, Inc. Is this true?

6. There is still no avenue for appeal if a damowner disagrees with the findings of the director.

7. Dams constructed prior to 1973, whose performance can be substantiated by historic data should be "grandfathered".

8. I was not able to ascertain if the current reg or guideline concerning the downstream routing effect with or without a dam would still be in effect.

9. Why is there a change from three categories to four? If the new regs are to be modeled after Virginia's regs, why don't we further break down the categories by dam size? This would have the effect of taking some of the subjectivity out of the design storm requirements. The difference in the latitude of the Director under the proposed regs would easily be in the Millions of Dollars. This is a significant amount of power and discretion.

10. In addition, I fully agree with the written comments by Raymond Alvarez in his letter dated August 1, 1994. Specifically, we agree that Sections 3.5.4 Risk Assessment, Section 7.4.2.d. A.(d) Existing Dams with Gated Drain Pipes should be "grandfathered" for dams completed before July 1, 1973. And Section 47-34-13.1 Dams Completed before July 1, 1973 should be modified by adding the following after the second sentence: "Stability and flood route analysis will not be required on low risk dams on the basis of historical performance of the dam".

11. And in addition, we would like to know specifically, what impact does this have on us, including but not limited to, storm design requirements?

In conclusion, I would hope the issues here will be addressed favorably so that we can be a part of the process in working in cooperation with you on this change, and in future matters. As always, you can reach me at 623-8293 at work or at 842-3579 at home.

Sincerely,

Gary Abbate
Chairman, Dam Committee
Maple Lake Club, Inc.

TERRA ENGINEERS INC.
ENGINEERS - GEOLOGISTS
1624½ KANAWHA BOULEVARD, EAST
CHARLESTON, WEST VIRGINIA 25311
(304) 346-7035

August 8, 1994

COMMENTS ON PROPOSED DAM SAFETY REGULATIONS

Page 1, subsection 2.5: Should "...the increment of time between vehicles..." be "...the average increment of time between vehicles..." (since the increment may vary)?

Page 2, paragraph 2.10.5: "... similar conveyance or such capacity..." should be "...similar conveyance of such capacity..."

Page 3, paragraphs 2.12.2 and 2.12.3: "Significant harm to the environment" is redundant, since harm to the environment is not significant unless it causes "harm to the public health or welfare." (See also comment on subsection 2.48, below.)

Page 4, paragraph 2.31.2: "...or bridges are harmed..." should be "...or bridges will be harmed..."

Page 6, subsection 2.48: "...alteration of habitat that adversely affects wildlife..." is an extremely broad statement that can result in varying degrees of interpretation. To what extent must an affect be "adverse"? Are all forms of wildlife to be included (field mice, minnows, etc.)?

Page 10, subparagraph 3.5.3.a: The depth of "sudden flooding" is an important consideration, for it could range from a few inches to several feet. Perhaps this should read, "a sudden flooding of inhabited land accompanied by..." Also, the terms "damaging velocity" and "wall of water" should be defined. Finally, a final sentence should be added to this subparagraph for clarification: "Risk assessment in accordance with paragraph 3.5.4 of this rule may be proposed to reduce the hazard class where applicable."

Page 28, subparagraph 7.4.2.a.D.(c): Suggest this subparagraph be changed to read, "Embankment Loading Conditions -- Loading conditions shall assume a long-term steady-state condition with the phreatic surface based on the maximum water level estimated from a transient seepage analysis, or, alternatively, with the phreatic surface originating at the elevation of the emergency spillway crest for embankment dams with emergency spillways or at a maximum design pool elevation for embankment dams without spillways."

Page 29, subparagraph 7.4.2.B.(b): The term "three dimensional analyses" needs to be clarified.

Page 30, subparagraph 7.4.2.d.A.(c): The term "normal base flow" needs to be defined since this must be considered in design of the drain system.

# WEST VIRGINIA MANUFACTURERS ASSOCIATION

2001 Quarrier Street, Charleston, WV 25311
Telephone: (304) 342-2123
FAX: (304) 342-4552




August 8, 1994

Mr. Brian Long
Division of Environmental Protection
Office of Water Resources
1201 Greenbrier Street
Charleston, West Virginia 25311

Re: Comments of the West Virginia Manufacturers Association Regarding Proposed Amendments to the Dam Safety Regulations 47 CSR 34

Dear Mr. Long:

Please find enclosed the Comments of the West Virginia Manufacturers Association regarding proposed amendments to the Dam Safety Regulations 47 CSR 34.

If you have any questions or comments, please let me know.

Very truly yours,

Robert L. Foster

Robert L. Foster

RLF/dsm

Enclosures

**COMMENTS OF THE**
**WEST VIRGINIA MANUFACTURERS ASSOCIATION**
**REGARDING PROPOSED AMENDMENTS TO THE**
**DAM SAFETY REGULATIONS**
**47 CSR 34**

## I. INTRODUCTION.

On June 30, 1994, the West Virginia Division of Environmental Protection ("DEP" or "Division") filed with the Secretary of State a proposed rule which would amend existing 47 CSR Series 34, the dam safety regulations. Accompanying the proposed rule was a notice requesting both written and oral comment. Pursuant to this notice, the West Virginia Manufacturers Association ("WVMA") has undertaken a review of the proposed rule, and files these comments.

The WVMA represents a broad cross-section of large and small industrial concerns throughout the State of West Virginia. In keeping with the WVMA's supportive position regarding the development of West Virginia's dam safety regulations, the WVMA offers these comments as a means to facilitate progress toward a reasonable and protective dam safety program, consistent with the requirements of the West Virginia Dam Control and Safety Act ("the Act"), W. Va. Code §§ 22-14-1 et seq.

## II. COMMENTS.

### 1. Definition of "Dam."

In order to conform to amendments to the Act, the definition of "dam" found in proposed 47 CSR 34-2.10 should be revised to delete Subsection 2.10.3. The analogous statutory

provision which excluded "slack water dams constructed and maintained in connection with public streets, highways, etc." from the definition of "dam" was removed from the Act during the recent legislative session. See W. Va. Code § 22-14-3(g).

**2. Proposed Amendments to the Hazard Classification System.**

The WVMA commends and endorses the Division's efforts to revamp the hazard classification system, insofar as those proposed revisions would create a fourth class of dams. The new hazard classification (i.e., Class 4 dams) as implemented by several of the other proposed amendments will allow the Division greater flexibility in addressing safety needs where the risks to human life and property are negligible. However, several of the proposed amendments to the hazard classification system would impose greater costs and expense on the regulated community without affording any real benefit to public safety. For convenience, such amendments are discussed below in the order in which they appear in the proposed rule.

**"High Risk" and "Low Risk" Highways.** The first such change involves the proposed use of "high risk highways" and "low risk highways" in lieu of "primary highways" and "secondary highways" for purposes of determining the potential risk to motorists. If these proposed amendments are incorporated into the final rule, applicants for a certificate of approval would be required to ascertain the "average time headway between vehicles" for all routes used for ground transportation within the proposed

dam's inundation area. That "average time headway" would then be compared with the projected duration of overtopping caused by a dam break to determine whether the transportation route is a "high risk highway" or a "low risk highway." As proposed, this process would require the applicant to incur the cost and expense of having a specific study made of each "roadway, roadfill, bridge, support structure, or other passageway for transporting persons, traffic, or other static or moving loads" located within the projected inundation area. Since there is no limitation with regard to the scope of the transportation routes which an applicant would have to examine, it appears that an applicant would have to study driveways and private roads as well as all public roads. This may create situations were an applicant would have to trespass on private property in order to comply with the rule.

Use of the "high risk" and "low risk" categories does not provide any benefit to public safety beyond that afforded by the current "primary" and "secondary" highway categories. Conducting a study of "average time headway" and comparing same with the projected duration of overtopping that may result from a dam's failure, does not provide a sound basis for assuming that a motorist will be exposed to a "higher" or "lower" risk in the event of dam failure. There is simply no way of accurately predicting whether motorists will be on an affected highway when a dam fails. Traffic flow patterns do not work in that manner. Apart from the statistical inaccuracies involved, classifying roadways by comparing the "average time headway" with the duration of

overtopping, assumes that the danger to motorists will pass when overtopping has ceased. This clearly fails to consider other latent dangers which may remain, such as debris washed onto the road or slides affecting passage. If, by proposing use of the "average time headway," the Division was attempting to quantify the risk to motorists, the WVMA suggests that the same goal is better achieved using the "primary" and "secondary" highway categories. Presumably, by their very nature "primary highways" will have more traffic than "secondary highways," and, thus, less "average time headway" between motorists. Moreover, the terms "primary" and "secondary" highway are commonly used by the Division of Highways to designate roadways, and may be readily identified by an applicant as well as the Division. The only practical difference between using the current categories and those proposed by the Division, is that the applicant will incur the expense of designing and conducting an analysis of "average time headway" for a potentially unlimited spectrum of transportation routes, and the Division will have to devote its resources to reviewing and approving these studies.

Accordingly, the WVMA recommends that the proposed definition of "high risk highways" found at Subsection 2.24 and the proposed definition of "low risk highways" found at Subsection 2.30 be omitted from the final rule, and that the Division retain the current "primary" and "secondary" highway classifications. Consistent with this recommendation, except as indicated below (See discussion of Class 2 Dams), the WVMA requests that all references

to "high risk highways" and "low risk highways" be replaced, respectively, with "primary highways" and "secondary highways." However, if the proposed categories are retained in the final rule, the WVMA requests that the scope of transportation routes for which a study will be required be limited to "primary" and "secondary" highways, and that definitions of those terms be retained in the definition section.

**"Major Damage" and Class 1 Dams.** The proposed term "major damage" would be one of the primary criteria used in determining the hazard classification of a dam. Whereas the existing rule considers only the types of roadways, buildings, or railroads (e.g., homes, isolated homes, normally unoccupied buildings, major or minor railroads) that would be damaged in the event of dam failure, the proposed hazard classification system would, in addition, require a determination that quantifies the extent of damage (e.g., major or minor). The WVMA objects to the use of these terms on the ground that, as applied in the rule, such additional determination (i) is speculative with respect to future damages, and (ii) would impose greater costs and expense on the regulated community without affording any real benefit to public safety.

The proposed definition of "major damage" found in Subsection 2.31 of the rule would be used to describe the characteristics of Class 1 and Class 2 dams. More specifically, this term would indicate (i) the degree of potential damage to dwellings, commercial or industrial buildings, main railroads, and

important public utilities which would provide the basis for classifying a dam as Class 1, and (ii) the degree of potential damage to unoccupied buildings which would provide the basis for classifying a dam as Class 2. Under the proposed definition, "major damage" is presumed where:

*2.31.1. The dwelling, commercial or industrial building, public highway or bridge, or public utility is in the direct path of the dam break flood wave; or*

*2.31.2. Public utilities equipment or public highways or bridges are harmed sufficiently to cause disruption of service, or to require repair or replacement of the public utility equipment, or public highway or bridge; or*

*2.31.3. The dwelling, commercial or industrial building or public utility will experience more than 1.5 feet of flood rise due to the dam break flood wave above the lowest ground elevation adjacent to the outside foundation walls; or more than 1.5 feet of flood rise due to the dam break flood wave above the lowest floor elevation of the dwelling, commercial or industrial building or public utility. The lowest of the elevations shall govern.*

See proposed Subsections 2.31.1 through 2.31.3.

The proposed definition of "major damage" is overly broad and would result in an undue increase in the number of dams categorized as Class 1. Based upon the foregoing instances where "major damage" is presumed, it is difficult to imagine an instance, other than for dams constructed in isolated areas where there are no buildings, public roadways or utilities downstream, in which the damage caused by a dam failure would not be considered major. For example, if there is a building, power pole or underground utility line of any type in the "path of a dam flood wave," then, under the proposed definition, the dam would have to be classified as Class 1. A second example further illustrates this point - if the basement of any building would accumulate more than 1.5 feet of

water because of a dam failure, then major damage would be presumed and the dam would be classified as Class 1. Subsection 2.31.3 of the proposed definition would support this finding, because dam flood waters would rise 1.5 feet above the floor level in that basement. This conclusion would appear to apply regardless of whether the basement is occupied, finished, used, or abandoned, and regardless of whether the building is in the direct path of the dam break flood wave.

The WVMA recommends that the last sentence of proposed Section 2.31 and Subsections 2.31.1 through 2.31.3 be deleted. This would clarify that major damage requires significant destruction, not just basement flooding. If this suggestion is rejected, then (i) the meaning of the critical phrase "path of the dam flood wave" should be clarified, (ii) the proposed definition of "major damage" should also be revised to exclude damage to unoccupied or abandoned buildings, and (iii) the criteria found in proposed Subsection 2.31.3 should be revised so that the phrase "above ground" is inserted immediately before the phrase "floor elevation of the dwelling." The last revision is suggested, in order to avoid inequitable results where the lowest floor in a building or dwelling is below ground in a basement. In such circumstances, any dam failure or stream flooding may easily exceed the 1.5 feet above the lowest floor level standard. Moreover, depending upon construction and drainage, for many basements, water may be expected to enter during normal rain events.

**"Minor Damage" and Class 2 Dams.** The proposed rule would define "minor damage" as follows:

*2.34. "Minor Damage" means insignificant harm to dwellings, commercial or industrial buildings, public highways or bridges, or public utilities that does not qualify as major damage.*

Basically, under this proposed definition, any damage not encompassed within the definition of "major damage" would be categorized as "minor damage." This term would be used to quantify the degree of damage which would result in a dam being classified as either Class 2 or Class 3, depending on the nature of the property that may be damaged.

The Division's proposed use of this term in determining the appropriate hazard classification for a dam will cause an increase in the number of Class 1 dams, and, thus, increase the costs of compliance and administration. As discussed above, the proposed definition of "major damage" would appear so broad as to include almost any damage caused by dam failure. There would appear to be few situations in which a dam's failure would lead to only "minor damage." Yet, to gain Class 2 or Class 3 designation, an applicant/owner would be required to show in its hazard evaluation that potential damages would not be major. This places the applicant/dam owner in the nearly impossible position of having to prove a negative.

In addition, the proposed criteria for Class 2 dams would make use of the new term "low risk highway." As discussed above, the WVMA generally objects to use of "low risk highway." This objection is especially relevant here, where "low risk highway"

would be used in lieu of "primary highway" which appears in the current criteria for Class B dams. Use of "low risk highway" in proposed Subsection 3.5.2.b would render the proposed Class 2 category inconsistent with and more restrictive than existing Class B, and would further increase the number of dams that would be classified as Class 1.

The proposed amendments indicate that the Division intended Class 2 dams to equate with the current Class B hazard classification. As presently worded, the proposed hazard classification system would not accomplish that end. To avoid this unintended consequence, the WVMA recommends that the definition of "minor damage" be deleted from the final rule, and that the existing criteria for Class B dams found in Subsection 3.5.2.b. be retained and redesignated "Class 2." In the alternative, if the proposed definition is retained, the WVMA recommends that the last sentence of proposed Section 3.31 - definition of "major damage" - and Subsections 2.31.1 through 2.31.3 be deleted.

**Class 3 Dams.** The WVMA endorses proposed Subsection 3.5.2.c, as being consistent with the existing criteria for Class A dams, except insofar as the term "minor damage" is incorporated into the proposed amendment. With respect to use of "minor damage" as a criteria, the WVMA objects for the same reasons stated in the immediately preceding discussion regarding Class 2 dams.

**3. Proposed Amendments regarding Hazard Evaluation.**

**Prohibition on Upstream Construction below top of Dam Elevation.** Proposed Subsection 3.5.3.d would (i) prohibit construction of any new, permanent structures upstream of the dam at elevations below the dam top, unless such structures are dam-related, (ii) authorize the Director to determine whether existing permanent structures will or will not obstruct operation of the dam, and whether such structures may remain, and (iii) authorize the Director to determine whether "small structures" effect the operation of the dam so that such structures may remain or be constructed. Such a provision is not authorized by the Act, and will likely result in litigation regarding whether the Director's action enforcing the proposed rule constitutes an unconstitutional taking of private property for a public purpose without just compensation. If this Subsection is incorporated into the final rule, the Director will be required to make an appropriate takings determination pursuant to The Private Property Protection Act, W. Va. Code §§ 22-1A-1 et seq., prior to taking action which would affect an existing or proposed structure on a particular parcel of property. This in and of itself will force the Division to incur great costs.

Moreover, this prohibition would likely render some of the most desirable locations for commercial development in West Virginia unmarketable and unusable. Much of the prime real estate in this State is located in the flat bottom lands adjacent to streams and rivers. Depending upon the design of a particular dam

(i.e., the elevation and capacity of drains, spillways, decants, etc.), proposed Subsection 3.5.3.d would prohibit construction in areas where the potential risk to dam operations posed by upstream flooding is minimal. This broad prohibition would harm the State's economic interests.

For the foregoing reasons, the WVMA recommends that the prohibition on upstream construction found in proposed Subsection 3.5.3.d be omitted from the final rule.

**Risk Assessment.** The WVMA endorses and supports the Division's proposal to allow an applicant to reduce a dam's hazard classification or design storm requirements by means of an appropriate risk assessment. However, as proposed, Subsections 3.5.4.a and 3.5.4.b would require the applicant to "demonstrate that the potential for loss of human life resulting from the dam failure is not significantly increased from that which occurs immediately prior to dam failure." This requirement is unclear, and may lead to misinterpretation and inconsistent enforcement. If this proposed requirement is directed at ensuring that the risk to human life posed by dam failure would not significantly increase should the request for reduction in hazard classification or design requirements be granted, then the WVMA recommends that the last sentence of proposed Subsections 3.5.4.a and 3.5.4.b be revised to read as follows:

> *The applicant must also demonstrate that the potential for loss of human life resulting from dam failure will not significantly increase if the reduction is granted.*

In order to lend some degree of predictability regarding whether a proposal for reduction of hazard classification or design storm requirements is worthwhile, the WVMA recommends that the Division consider revising proposed Section 3.5.4 to include a definition of "significantly increase." This could be accomplished by adding a new Subsection, such as:

*3.5.4.c. For purposes of Subsections 3.5.4.a and 3.5.4.b of this rule, the potential for loss of human life will be considered to "significantly increase" if there would be a more than fifteen percent (15%) rise in the potential loss of human life over that which is projected if the reduction is not granted.*

**3. Proposed Amendments to Plan and Specification Requirements.**

Section 6.4.6. requires the person constructing a dam to provide proof that he has applied for a NPDES general stormwater permit if he will be disturbing more than 3 acres. While a stormwater construction permit is currently required in that situation, it may change in the future to require general permit coverage similar to the federal permit - e.g., when 5 acres or more will be disturbed. Therefore, the WVMA suggests that Section 6.4.6. be changed by deleting the 3 acre reference in Section 6.4.6. a and b.

**4. Proposed Amendments to the Design Storm Requirements.**

**Class 1 Dams.** The WVMA endorses the Division's proposed amendments to the design storm requirements for Class 1 dams found in Subsection 7.1.1.b.A insofar as the amended requirements would allow greater flexibility in determining appropriate design requirements. However, as indicated in the preceding comment

regarding hazard classification, unless revised, the proposed amendments will likely result in an increase in the number of Class 1 dams. For this reason, the WVMA urges the Division to give thorough consideration to the comments which follow.

**Class 2 Dams.** The WVMA objects to the proposed revisions of the storm design requirements applicable to Class 2 (formerly Class B) dams. There have been no changes in the Act which require the Division to heighten these requirements. Proposed Subsection 7.1.1.b.B would require Class 2 dams to be designed for 50% of a probable maximum precipitation ("PMP") storm of 6 hours duration, with the possibility of obtaining reduction of this design storm requirement to not "less than 25% of the PMP" using the risk assessment procedure. This is more stringent than the design storm requirements currently applicable to Class B dams. Under the existing rule, an applicant may use storm designs ranging from a "minimum P100 storm" design up to 50% of a 6-hour PMP design, subject to the requirement that "the magnitude of the storm must closely relate to the degree of anticipated downstream damage based upon information provided to the applicant by the Director." The existing design standard is protective of public safety and allows for flexibility, taking into consideration the potential downstream damage, without resort to the extra step of performing a risk assessment. Requiring the applicant/owner to perform a risk assessment to obtain a reduction in storm design will provide no real benefit to public safety. However, under the amended rule,

the applicant would have to incur the expense and delay of the risk assessment procedure.

Moreover, how will the proposed amendment to the design storm requirements applicable to Class 2 dams affect existing Class B dams? If this design criteria is changed, as proposed, many existing dams may no longer comply with the rule. When the Certificate of Approval for an existing dam is renewed, the owners of that dam should not be required to redesign their dams or forced to demonstrate that the design storm used in the existing permit is sufficient to merit a reduction under the new risk assessment procedure. To interpret the rule otherwise, would cause dam owners to incur increased costs and expense, and increase the administrative burden on the Division without any significant benefit to public safety.

Based upon the foregoing, the WVMA recommends that the storm design requirements currently applicable to Class B dams be retained in the final rule for Class 2 dams.

**Class 3 Dams.** The WVMA also objects to the proposed revisions of the storm design requirements applicable to Class 3 (formerly Class A) dams. As stated above, there have been no changes in the Act which require the Division to heighten these requirements. Further, the revision of these requirements found in proposed Subsection 7.1.1.b.C is inconsistent with the Division's apparent intent to equate Class 3 dams with existing Class A dams. Again, the WVMA requests clarification with respect to how this amended design criteria would apply to existing Class A dams. The

WVMA recommends that the Division retain the existing requirement applicable to Class A dams, and require that "Class 3 dams shall be designed for a minimum P100 storm of six (6) hours in duration."

**Class 4 Dams.** Instead of creating a new design standard for this proposed hazard classification, the Division proposes to utilize the storm design criteria which are currently applicable to Class A dams. If the Division intends to create a new hazard classification which would require less demanding design requirements appropriate to situations where the risk to human life is negligible, then the WVMA recommends that proposed Subsection 7.1.1.b.D be revised to allow for some flexibility in determining the requisite design standard. For example, proposed Subsection could be revised to read as follows:

*7.1.1.b.D. Class 4 Dams - Class 4 Dams shall be designed for a minimum P100 storm of four (4) hours in duration or a maximum P100 storm of six (6) hours in duration. The magnitude of the storm must closely relate to the degree of anticipated downstream damage based upon information provided to the applicant by the Director.*

This revised version of Subsection 7.1.1.b.D would allow for appropriate consideration of public safety, while providing for a reduction in storm design requirements in appropriate circumstances.

**4. Amendment Restricting Availability of Risk Assessments for Use in Relation to Waste Disposal Dams.**

The WVMA opposes the proposed amendments to Subsections 7.1.2.c.A.(b) and 7.1.2.c.A.(c) which would prohibit use of risk assessments to reduce the storm design criteria applicable to waste

disposal dams which utilize decants or principal spillway design, or which rely on pumping or other means to reduce storage volume caused by storm events. There is no reason why the owners of such waste disposal dams or applicants proposing to construct same should not be allowed the flexibility of using a risk assessment to gain a reduction in storm design requirements, provided that the owner/applicant can make a showing that the methods of relieving accumulated volume are sufficient to maintain the dam's integrity for the relevant storm event. Accordingly, the WVMA recommends that these proposed amendments be omitted from the final rule.

**5. Amendment to Sliding Safety Factor for Gravity Dams.**

The WVMA supports the proposed amendment which would allow an applicant or dam owner to obtain reduction in the sliding safety factor for normal loading conditions where such applicant/owner has demonstrated intimate knowledge of subsurface conditions.

**6. Amendment with regard to Existing Freshwater Dams which use Conduit Spillways.**

Proposed Subsection 7.2.4.d.A.(d) would (i) require all existing freshwater dams which use conduit spillways and are equipped with gated drain pipe to meet the design requirements found in Subsection 7.4.2.d.A.(c), and (ii) would authorize the Director to require owners of existing freshwater dams which use conduit spillways, but which have not previously installed an upstream gate or valve, to install same. If retained in the final rule, this proposed Subsection will cause owners of existing dams

to incur significant, unforeseen expense. This is even recognized in the proposed Subsection, which provides for an extension of compliance time where installation of the valve or gate will require draining of the reservoir and "cause major economic loss to the owner." Despite this attempt to mitigate the harsh effect of retroactive application of this proposed Subsection, the requirements which it would impose may abridge the constitutional prohibition on ex post facto laws. This is a real possibility, given that the Act imposes criminal penalties for failure to comply with the requirements of this rule. See W. Va. Code § 22-14-13(a). To ensure constitutionality, the WVMA recommends that proposed Subsection 7.4.2.d.A.(d) be removed from the final rule. Omitting this proposed Subsection from the rule would avoid future constitutional challenge, while preserving the mandate of existing Subsection 7.4.2.d.A.(c), which presently requires installation of upstream gates on such dams.

**III. CONCLUSION.**

The WVMA appreciates having this opportunity to present its comments and suggestions. Respectfully submitted, this the 8th day of August, 1994.

Ms. Karen S. Price, President
West Virginia Manufacturers Association
2001 Quarrier Street
Charleston, West Virginia 25311
telephone 342-2123