Cape Cod Cranberry Growers' Association
GROWER ADVISORY
Dam Maintenance, Safety and Liability

Water control structures are essential to a successful cranberry operation. Among these structures are dams, spillways, and conduits used to temporarily divert water flow, dikes and flumes, and structures fitting the more traditional definition of a dam, used to permanently detain water, creating the reservoirs required in the bog system. As old bogs are taken out of production, new bogs are constructed and new engineering techniques are adopted some existing water control structures will inevitably become obsolete, at least from the perspective of the grower. This advisory will discuss the responsibilities of the owner of the structure in terms of maintenance, safety and liability on both structures in-use and those that have been abandoned.

Structures Controlled by The Dam Safety Regulations of The Department of Conservation and Recreation

Currently the Department of Conservation and Recreation (DCR) defines a "Dam" as any artificial barrier, including its associated spillways and water conduits 25' or more in height or having the capacity for water storage of 50-acre feet* or more. In addition, the Commissioner of the DCR has the authority to classify any structure as a dam which if breached could endanger property or public safety. Any structure greater than six feet in height or impounding more than 50 acre feet of water may also be classified as a dam. ** An acre-foot is equal to 43,560 cubic feet of water. **

In 2002 the CCCGA negotiated with the state legislature to **exclude from the definition of "dam" any structures which are used to temporarily divert water on land in agricultural use**. **Also excluded from the associated regulations are any barrier classified as small and/or low hazard that is on land in agricultural use. Consequently, this advisory applies to only a small group of growers.** These exemptions were incorporated into the 2003 draft review regulations and should be approved in the near future effectively removing many water control structures on the bog from regulation under 302 CMR 10, Dam Safety.

Dam Owner Liability

302 CMR 10.13 states that the dam owner is responsible for damage to the property of others and any injuries resulting from the operation or failure of a dam. It also emphasizes that the DCR does not accept liability for dam failure even if the dam was permitted and approved by DCR, ultimately making it the owner's responsibility.

Dam Registration

The state has long kept a list of dams that are known in the commonwealth and has used this list to help keep track of inspections, which were the responsibility of the state. In addition, the state sent consultants to inspect all dams in 1998. It is important to note that neither of these activities constitute dam registration with the commonwealth. Dam registration is new to the commonwealth and is intended as a means to establish public record of the dam. The Office of Dam Safety expects 302 CMR 10 to be promulgated (enacted) in Fall of 2005 and expects to start mailing out "Dam Registration Forms" shortly thereafter. **These forms will not be mailed to growers whose dams fall under the exemption and exempt dams do not need to be registered.** Within 30 days of receipt of these forms the owner must return it completed along with the registration fee. If DCR approves the registration, a Certificate of Registration will be issued which must be filed with the county office of the Registry of Deeds within 14 days of receipt. In addition, a dam owner must notify DCR of the proposed transfer of legal title of the dam if it, with surrounding land, is to be sold.

Dam Size and Hazard Classification

To know if water control structures on your property will be exempt from the regulations of a defined dam, you must first understand how DCR classifies dams according to size and hazard class. In addition, size and hazard classifications dictate inspection schedules and adherence to design criteria based on their potential for damage to life or property in the area downstream from the dam in the event of a failure. These classifications will be made by the commissioner of the DCR and will be noted on the owner's Certificate of Registration. Note that it may be necessary to periodically reclassify dams

Hazard Potential Classification Table
High Hazard (Class I) Dams located where failure will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways or railroads.
Significant Hazard (Class II) Dams located where failure may cause loss of life and damage homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use of service of relatively important facilities.
Low Hazard (Class III) Dams located where failure may cause property damage to others. Loss of life is not expected.

according to new and changing environmental conditions as well as additional development downstream.

For dams that are found in a series any upstream dam that is capable of causing failure in a downstream dam because of its flood wave will have the same hazard classification or higher as the downstream dam. If the dam will not cause failure of the downstream dam, the upstream dam may have a different classification from the downstream dam.

Size Classification Table

Category	Storage (acre-feet)	Height (feet)
No Jurisdiction	Not in excess of 15 feet (regardless of height)	Not in excess of 6 feet (regardless of storage)
Small	>=15 and <50	>=6 and <15
Intermediate	>= 50 and <1000	>=15 and <40
Large	>= 1000	>=40

Dam Inspection Schedule

The owner of the dam must periodically inspect all dams in accordance with this schedule. The time periods listed here are the maximum time allowed between inspections. High and significant hazard dams in which the condition is deemed poor must be inspected and reported on every six months until the dam safety repairs are completed and the dam is found to be in satisfactory condition. In the inspection process the owner must employ a registered professional engineer experienced in dam design. The inspection report completed by the engineer must be submitted in a sealed envelope. In addition, the owner must submit a statement of his or her intent to implement the recommendations of the engineer. If the owner fails to inspect the dam in the necessary time frame, the state may do so and charge the owner for the service. When performing the inspections engineers work off a template addressing the following criteria and resembling the following:

Formal Inspection Frequency

Hazard Potential	Inspection Frequency
Low	10 years
Significant	5 years
High	2 years

Embankment
Crest

(action needed)
M=Monitor
I=Investigate
R=Repair

	Condition	Observations	M	I	R
1	Surface Cracking				
2	Sinkholes, animal burrows				
3	Low Areas				
4	Horizontal Alignments				
5	Ruts and/or puddles				
6	Vegetation Condition				
7	Unusual Movement				
8	Other				
	Upstream Slope				
9	Slide, Slough, Scarp				
10	Slope Protection				
11	Sinkholes, Animal Burrows				
12	Emb.-Abut. Contact				
13	Erosion				
14	Vegetation Condition				
15	Unusual Movement				
16	Other				

Embankment
Downstream Slope

1	Wet Areas (No Flow)
2	Seepage
3	Slide, Slough, Scarp
4	Sinkholes, Animal Burrows
5	Emb.-Abut. Contact
6	Erosion
7	Unusual Movement
8	Vegetation Condition
9	Other

Embankment
Instrumentation

10	Piezometer/Observation Well
11	Staff Gage and Recorder
12	Weirs
13	Survey Monuments
14	Drains
15	Frequency of Readings
16	Location of Records
17	Other

Downstream Area and Misc.
Downstream Area

1	Abutment Leakage
2	Foundation Seepage
3	Slide, Slough, Scarp
4	Drainage System
5	Vegetation Condition
6	Downstream Hazard Condition
7	Status of Emergency Action Plan
8	Other

Miscellaneous

9	Reservoir Slopes
10	Access Roads
11	Security Devices
12	Other
13	Other
14	Other

Spillways
Erodible Channel

1	Slide, Slough, Scarp
2	Erosion
3	Vegetation Condition
4	Debris
5	Other

Non-Erodible Channel

6	Sidewalls
7	Channel Floor
8	Unusual Movement
9	Approach Area
10	Weir or Control
11	Discharge Area
12	Other

Other Spillway Structures

13	Intake Structure
14	Trashrack
15	Stilling Basin
16	Piping

(Inspection Checklist Cont'd)

Concrete/Masonry Dams

Upstream Face

1	Surface Condition
2	Condition of Joints
3	Unusual Movement
4	Abutment-Dam Contacts

Downstream Face

5	Surface Condition
6	Condition of Joints
7	Unusual Movement
8	Abutment-Dam Contacts
9	Drains
10	Leakage

Crest

11	Surface Condition
12	Horizontal Alignment
13	Vertical Alignment
14	Conditions of Joints
15	Unusual Movement

Outlet Works

1	Intake Structure
2	Trashrack
3	Stilling Basin
4	Primary Closure
5	Secondary Closure
6	Control Mechanism
7	Outlet Pipe
8	Outlet Tower
9	Erosion Along Dam Toe
10	Seepage
11	Unusual Movement
12	Other
13	Other

In addition to this checklist the engineers report will include a field sketch, dam and owner identification and persons present at inspection.

Compliance With the Inspection

Ultimately it is the commissioner of the DCR who determines whether a dam meets accepted safety standards. If the commissioner determines that the dam does not meet these safety standards and a threat to life or property exists, he can issue a certificate of non-compliance, which will be recorded with the registry of deeds in the county where the dam is located. If the dam meets safety requirements the owner will be issued a certificate of compliance. The commissioner of DCR has the authority to determine maximum allowable water elevations in reservoirs where dams have been determined to be unsafe. When the spillway capacity of the dam does not meet the necessary criteria, an impact analysis may be required by the owner.

Dam Repair, Alteration, Breach or Removal Permitting

Any person proposing to construct, alter, breach, or remove a dam must file a notice of intent with the DCR so that a determination can be made as to whether a permit is required. It is important to note that normal maintenance does not require a permit. All permit applications must comply with DCR's standard design and construction criteria, 302 CMR 10.14, which is not covered in this advisory. For any of these proposed projects on a dam a preliminary report and final design report must be filed with the application. Approval or denial to perform alterations on the dam will be issued within 60 days of receipt of the final design report and permit application. If the application is not approved a detailed explanation will be provided. The preliminary report and final report may be submitted as one document.

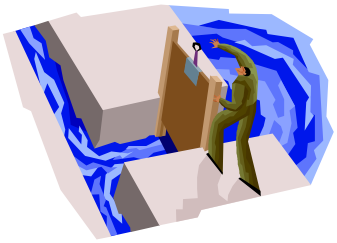
The preliminary report must include the following information:

1. Completion of all required information on the application
2. Maps showing the location of the proposed structure that include the county, location of state roads, access to site, and outline of the reservoir
3. Preliminary drawings or sketches that include cross-sections, plans, and profiles of the dam, proposed pool levels, and type of all spillways
4. Preliminary design criteria and basis for selection including a description of the size, ground cover conditions, and extent of the development of the watershed drainage area, spillway design, storm, geology, and geotechnical engineering assumptions for the foundation and embankment materials, and type of materials used in the principal spillways
5. Book and page number of location of the dam as recorded in the registry of deeds with the name of the registry

The final report must include the following information:

1. A report of the foundation of soils or bedrock and the borrow materials, including the location of borrow areas, that are to be used to construct or repair a dam
2. Analysis to indicate that the dam will be stable during construction and filling and under all under all conditions of reservoir operations
3. Engineering work indicating that the dam is safe against overtopping during occurrence of the inflow design flood and wave action
4. Design data or references to indicate that seepage flow through the embankment, foundation, and abutments will be controlled to limit internal erosion and sloughing in the area where
5. Calculations and assumptions relative to the design of the spillways
6. Provisions to protect the upstream slope, crest, and downstream slope of earth embankments and abutments due to wind and rain
7. Other design data, assumptions and analysis pertinent to individual dams and site conditions
8. A proposed construction schedule
9. A proposed filling schedule for the reservoir
10. A maintenance and operation plan
11. For high and significant hazard dams, an emergency action plan to be implemented in the event of dam failure

In addition, two sets of plans and specifications must be submitted along with the final design report. No construction should begin on the dam until a permit has been issued by DCR and has been filed with the registry of deeds in the appropriate county. Construction must begin within two years of the permit being issued. If draw down of a reservoir is required for breaching or repair of a dam, the owner must provide notice to DCR and the local conservation commission at least 3 weeks prior to the start of the work. During the construction or dam modification the DCR may enter the site to inspect the dam without any prior notice.



Fines for Non-Compliance

The 2003 changes to the "Dam Safety" rules and regulations give the DCR the power to levy fines against perceived violators. The following six violations all carry fines of p to $500.00.

1. Failure to register a dam with the office of dam safety of the DCR and the registry of deeds
2. Failure to notify the office of dam safety of the transfer of the dam from one owner to another
3. Failure of the owners of "High Hazard" dams and newly constructed "Significant Hazard" dams to provide an up to date emergency action plan to the office of dam safety and the Massachusetts Emergency Management Agency
4. Failure of the owner to comply with the conditions set for the dam safety permit in dam construction, alteration, removal, etc.
5. Failure of the owner to obtain the safety permit prior to work on the dam
6. Failure of the owner to provide the office of dam safety with an inspection report with the required content and in the required timeframe.

The information in this guide is provided by the Cape Cod Cranberry Growers' Association as a service to its members. The information represents our interpretation of the state requirements and by no means is intended to act as a substitute for reading and following the specific regulatory requirements.

Department of Conservation and Recreation's
Dam Safety Rules and Regulations can be viewed at:

302 CMR 10

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