

INSPECTION, OPERATION AND MAINTENANCE (IOM) PLAN

ABC DAM

(LOCAL/Common Name of Dam, if applicable)

TOWNSHIP, WI

(Stream System)

Dam Key Sequence Number (DKSN) #####

Field File (FF) Number ##.##

Insert photo of dam here by clicking in this text box, go to the "Insert" tab, click on "Pictures", select photo, click "Insert". Delete this text and resize photo and text box.

COUNTY: TO BE INSERTED

OWNER: TO BE INSERTED

	Dam Owner	Dam Operator
Name		
Mailing Address		
Email Address		
Phone		

IOM prepared by:

Name (Title, Organization)

Date

!!Instructional Information Only!!

Please delete THIS ENTIRE PAGE when IOM update/development is complete.

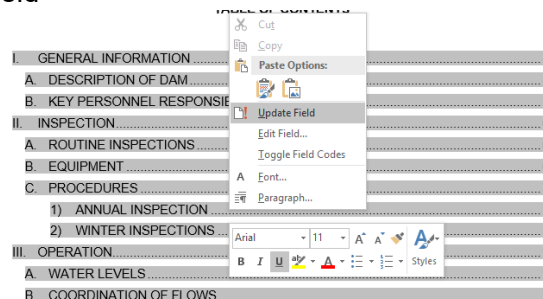
1. Anything ***italicized and highlighted yellow*** is for instructions or suggested language only. Delete if not used or applicable to your dam.
2. Anything with **yellow highlight** needs to be updated to match your dam.
3. No **yellow highlights** should be present in the final version of your IOM.
4. Some IOM sections will not apply to your dam. Please ask the WME if you are unsure about sections to remove/keep. Remove sections that do not apply to your dam (e.g., remove the Early Warning Detection System section if your dam does not have one); the document heading numbers should automatically update.

After all updates are done you will need to update the table of contents. Because this is a linked document the information will update automatically when you tell it to do so:

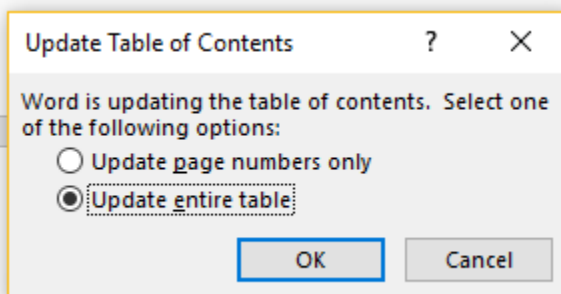
1. Click anywhere in the table of contents so that gray shows up behind the words.

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3. Select “Update entire table” so that both the headings and page numbers update. If you changed heading names you may notice that some of the headings will not be capitalized correctly – you will need to find them in the document and type them in all caps and repeat steps 1-3.



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I. GENERAL INFORMATION

This document describes a plan of inspection, operation and maintenance for the ABC Dam. This plan should be periodically reviewed and modified to reflect operational and structural changes. The inspection and maintenance forms and other applicable figures are designed for easy revision.

This plan was prepared to conform to Dam Design and Construction Standards – “Hydraulic Design and Safety Requirements (3) Safety Measures Requirements”, Chapter NR 333.07(3), Wisconsin Administrative Code.

The purpose of the Inspection, Operation and Maintenance (IOM) plan is to provide the owner and operator of the dam and other officials with basic guidelines which assist the operator to:

- Perform routine and recommended professional safety inspections
- Properly document routine inspections using the checklist in the appendix
- Define and document normal operation procedures
- Define operational procedures during emergency events
- Properly document maintenance requirements and activities

Inspection, operation and maintenance procedures are needed to ensure the overall integrity of the dam and the public’s safety.

A. DESCRIPTION OF DAM

The ABC Dam is located on the XYZ stream/river/lake systems. The dam is accessed via insert access location information. A map showing the location of the dam and access roads can be found in Appendix A.

Type of dam	Embankment with whistle tube
Type of control	# slide/split leaf gates, #-foot wide stop logs
Structural height (feet)	##
Maximum storage capacity (ac-ft)	###
Primary use	Recreation, wildlife, fishery
Hazard rating	High/Significant/Low

Include any other information to describe dam. As-built plans can be found in Appendix B.

Nearby dams include the DEF Dam located approximately # miles upstream and GHI Dam located approximately # miles downstream.

	Upstream Dam	Downstream Dam
Name	DEF	GHI
Field File Number	##.##	##.##
Location		
Owner Name		
Contact Information		

B. KEY PERSONNEL RESPONSIBILITIES

It is the owner's responsibility to operate, inspect and maintain the dam. The owner is ultimately responsible and liable for any damages should the dam be operated incorrectly or fail.

The operator listed on the title page is the primary operator of the dam, although other staff may operate the dam if needed to do so. Changing water levels in the impoundment, especially during high or low flow conditions, may require the operator to operate the gates. The operator shall notify adjacent upstream and downstream dam operators about gate opening changes that are out of the ordinary and the resulting pool level and flow.

The owner and operator have been trained by insert name of person/company to identify potentially dangerous flow conditions and possible emergency situations. During an emergency, the dam operator will follow the procedures outlined in the ABC Dam Emergency Action Plan (EAP).

II. INSPECTION

A. ROUTINE INSPECTIONS

Routine inspections are a necessary part of owning and operating a dam. Routine inspections provide a way to monitor a dam's performance and identify changed conditions at the dam. Early detection of gradual changes can reduce maintenance and repair costs.

All routine inspections shall be performed by **the dam operator**. A blank inspection checklist is located in Appendix C. Records of completed inspections, and associated documentation, will be kept on file at the **insert physical and/or electronic location**.

Routine inspections include:

- **Daily/Weekly/Monthly**
 - Observation log in Appendix D
 - River flow observations
 - Precipitation records
 - Water level reading
 - Gate operation
 - Seepage monitoring
- Monthly
 - Equipment log in Appendix D
 - Operating equipment
 - Safety equipment
 - Visual observation of spillway and embankment structure
- Annual or post-storm
 - Inspection checklist in Appendix C
 - Verify staff names and phone numbers in IOM and EAP

Required inspections per Ch. 31.19(2)(ag) will be completed by a DNR Water Management Engineer. The frequency of professional inspections is set based on the hazard rating of the dam.

B. EQUIPMENT

The dam owner, operator or qualified staff shall be adequately equipped for inspection.

The following items are recommended:

- Camera with flash
- Range pole/rebar
- Ruler with graduations large enough to be identified on photos
- Knives for prying cracks and removing materials
- Crack gauges
- Copy of site map to note locations of problems and changing conditions
- Life jacket
- Cell phone
- Spray paint or flagging
- ***Other tools or equipment specifically needed to inspect dam***

Identify the location of who/where keys are to unlock access gates/open fencing/structure locks and where stop log pick/cables/hoists and extra stop logs/boards are located.

C. PROCEDURES

1) ANNUAL INSPECTION

1. Print copy of the checklist in Appendix C to bring along to the dam
2. In general, note apparent deficiencies on checklist and mark locations needing attention with spray paint or flagging; photograph deficiencies from several different viewpoints, both at a distance and close up
3. Locate signage, fencing, benchmarks and staff gauge
 - a. Inspect condition of security fencing
 - b. Note whether gate/fencing was locked
 - c. Inspect condition and visibility of portage and dam warning signage
 - d. Inspect gage and document water level
 - e. Verify benchmarks and remove debris if necessary
4. Walk across the crest from abutment to abutment
 - a. Look to see if there are ruts, depressions or uneven locations on the crest
 - b. Look to see if/where there is woody vegetation on the side slopes
 - c. Evaluate the location where the abutment meets the natural ground (groin); check for seepage
5. Check upstream slope by walking in an up and down or zigzag pattern from abutment to abutment
 - a. Look for holes, burrows, slumps, slides, erosion, cracks and settlement
 - b. Evaluate condition of any upstream riprap and signs of wave action erosion
6. Check downstream slope by walking in an up and down or zigzag pattern from abutment to abutment
 - a. Look for holes, burrows, slumps, slides, erosion, cracks and settlement
 - b. Evaluate condition of any downstream riprap
 - c. Look for seepage on the slope and in the area ~10-20 feet downstream of toe
7. Check pipes
 - a. Inspect metal pipes for joint deterioration, rust, holes, misalignment and any deformation in the shape
 - b. Look for debris and blockages
 - c. Look for water leaking into downstream portion of pipe
 - d. Observe if there is any settlement or movement of outlet
 - e. Check toe drain pipes for seepage, note quality (clear or cloudy) and estimate quantity of seepage
8. Evaluate control structures and primary spillway
 - a. Look for debris and blockages in inlet and outlet
 - b. Check to make sure stop logs/boards are still in place, but not stuck
 - c. Inspect stop logs and stop log channels for damage

- d. Review/identify storage location of hook/device used to remove stoplogs
 - e. Inspect gates, gate chains, cables, electrical operation, ice damage
 - f. Determine if there is a system in place to keep gates from freezing
9. Evaluate concrete
- a. Inspect concrete for new cracks, holes, and deterioration
 - b. Inspect existing concrete cracks to determine if length/width are changing
 - c. Observe if there is any settlement or movement of structure
 - d. Traverse spillway abutments (where concrete or metal part of structure meets the earthen part of the dam and where these parts meet the natural ground surface) to gain a general feel for the conditions at the material interfaces
10. Evaluate auxiliary spillway
- a. Look for settlement, cracks and erosion
 - b. Identify any tree/shrub growth or debris blockage
 - c. Observe signs of flow (e.g., grass bent over, debris present, etc.)
11. View impoundment from different locations to develop familiarity with normal conditions
12. Observe downstream channel
- a. Evaluate extent of scour and any structural (undermining) issues
 - b. Drive to the next downstream bridge/culvert crossing downstream of the dam to maintain familiarity with locations of residences and property which can be affected by operation of the dam or dam failure
13. Inspect any other appurtenant structures or devices

2) WINTER INSPECTIONS

Ice formation during the winter months can damage gates, spillways, flashboards and any other component of a dam in direct contact with the ice formation. Spring thaws can produce ice jam conditions.

Insert winter inspection procedure (frequency, how to access etc.)

III. OPERATION

A. WATER LEVELS

Dams are part of a dynamic system composed of the river, the dam and precipitation. The dam operator needs to monitor flow conditions and precipitation rates and adjust the dam as needed. Under certain conditions some dam owners will need to notify downstream dams of changes in operation.

The required pool levels for the ABC Dam per permit/docket order # are:

Maximum	### (Winter/Summer)
Minimum	### (Winter/Summer)
Normal	### (Winter/Summer)

Water level readings and are based on the water level gage located describe location. *If applicable, briefly describe the type and number of gates or stop log bays on the dam and operation procedures during normal, low and high flows. How/when are the gates/stop logs normally operated and why, how does the impoundment respond to a rain event (e.g., 2 inches of rain typically corresponds to an increased water level of approximately 0.5 inches), etc. Any management of impoundment for wild rice? If so, what is the typical procedure - when is board removed, when replaced, etc.*

B. COORDINATION OF FLOWS

The flow of water between dams must be coordinated to reduce the risk of damage to the dams as well as nearby structures and property. *If applicable, briefly describe how flows are regulated between any upstream or downstream dams including how lake/pool levels are maintained and the location/type of any gauges or other measuring devices. Describe when contacts to up or downstream dams will be made.*

C. DRAWDOWNS

If applicable, briefly describe how the dam will be prepared for winter ice conditions and spring thaws including how the pool will be lowered and how the drawdown will be coordinated with any upstream or downstream dams and affected property owners. Describe special procedures for drawdowns in order to remain in compliance with an ordered water level. Consult with the DNR Water Management Specialist to evaluate natural resource concerns for drawdown timing.

D. MECHANICAL EQUIPMENT AND VEHICLES

- If applicable, briefly describe any mechanical equipment or vehicles used to operate or maintain the dam. Any Operation and Maintenance manuals for vehicles and systems on dams such as electrically operated gates, motors, weirs, drains, filters or seals should be listed and the manuals including any diagrams should be included as an appendix to the dam's IOM.*
- Briefly describe how the dam is illuminated during the night including where lights if any are located, off site light sources and portable light sources. Include the contact information for any portable light sources not owned by the dam owner/operator.*

E. EMERGENCY CONDITIONS

1) EARLY WARNING DETECTION SYSTEM

There is no early warning system for the dam.

Or, if the dam has an Early Warning System (a human observer-based flood notification system or an electronic flood notification system), delete the above sentence and briefly describe the warning system, the owner/operator responsibilities, the trigger for lowering pool levels, method for controlling flow, and level and type of monitoring.

2) IDENTIFICATION OF EMERGENCY

Often emergencies arise due to weather events. Significant predicted weather events may cause the water level above the dam to rise quickly. Dangerous flow conditions at this dam include, but are not limited to:

- Extended periods of greater than average precipitation
- Rapidly increasing headwater levels (greater than 2" increase per hour)
- Melting periods combined with greater than average precipitation
- Debris buildup, beaver dams or ice jams at the dam inlet

Describe what flood conditions look like at the dam; what is the highest water level ever observed, how high did the water level reach on the last known storm size, etc. Is it common for auxiliary spillway to be used? Describe how the dam will be operated during emergency conditions; will the gate(s) be operated? In what order? Will stop logs be removed?

Other potential emergency situations that may or may not be associated with weather include:

- Slumping or sloughing of the dam's embankment
- Excessive erosion of the embankment below the spillway
- Excessive seepage or cloudy seepage through the embankment
- Settlement or cracking in the embankment
- Piping or boils in the embankment or immediately downstream
- Noticeable movement of any portion of the outlet structure
- Vandalism activity near the dam
- Ice build-up at the dam inlet
- Upstream and Downstream Dam Operation Procedures

If there is an emergency reference the Emergency Action Plan (EAP) for the dam.

IV. MAINTENANCE

Maintenance should be performed regularly at the dam. Routine, annual, and post-storm inspection results will provide insight to how often and to what degree maintenance is required. A record should be kept of all maintenance activities (see Appendix E for maintenance log) and will be kept on file at the: **insert physical and/or electronic location.**

Large repairs typically require that plans and specifications be submitted to the DNR for approval prior to completing the work. Contact a DNR Water Management Engineer for input on whether formal approval is required.

A. FREQUENCY

Periodic maintenance and item replacement are expected, and preventative maintenance activities will increase as the dam ages. Maintenance should be routinely performed. Some items require more frequent attention than others.

Annual maintenance items include:

- Mowing embankment crest, mowing/burning upstream side slope down to the edge of the water, mowing/burning downstream side slope to ~10-20 feet downstream of the toe of the slope
- Tree and brush removal from embankment
 - 20 feet beyond right and left embankment groins to prevent encroachment
 - Down to the water's edge on upstream side
 - 20 ft beyond toe of embankment on downstream side to detect seepage
- Filling rodent holes
- Repairing embankment erosion
- Checking boards/stop logs and replacing as needed
- Greasing motors
- Patching surficial concrete cracks
- Replacing waterproof filler materials between concrete joints
- Fixing cables and chains
- Testing lake drain valve

Higher frequency maintenance includes the following items and is completed by the dam operator:

- Mowing regularly to maintain grass < 6-inch tall
- Removing debris from spillway
- Checking for beaver dams

B. FUNDING

Since dams hold back water under pressure, repairs often need to be done differently than at other types of structures. Many items can be repaired by the dam owner or operator with available resources and funding.

Describe specifics associated with funding of your dam. For example, is dam solely funded by you? Are others involved with funding? Do you pay someone to do maintenance or do you do it yourself? How much per year for maintenance? Do you plan to allocate so much per year in preparation for larger projects?

V. UPDATING THE IOM

Review IOM annually for changes in staff or inspection, operation or maintenance needs. If there are changes, update the plan and send it electronically to the DNR Water Management Engineer for review and approval. If no changes to the IOM are needed, please send an email to the DNR Water Management Engineer indicating that no changes were needed.

Document stored at: **Insert description of electronic and physical location**

APPENDIX A: LOCATION MAP

Insert location map of showing dam's location; can use the same location map as used in the EAP, if available.

The map should clearly identify:

- The name and location of the dam access road. Note if key to locked gate is needed to access. If access to the dam is by some means other than a road, please describe and have it marked on the map.
- Public access points to the impoundment.
- The location of the water control structure; note if key is needed for fence, riser, etc. to access control mechanism (stop logs, gate, etc.).

APPENDIX B: AS-BUILT PLANS

Locate, scan and insert plans to file once PDF is created.

APPENDIX C: INSPECTION CHECKLIST

The inspection procedure can be found in the Inspection Section of the IOM.

A checklist for inspections required under ss. 31.19 (2)(ag) can also be found at:
<http://dnr.wi.gov/topic/dams/documents/DamInspectionChecklist102011.pdf>

Remove items from the checklist that do not apply to the dam the IOM is being written for.

ABC DAM INSPECTION CHECKLIST
 FIELD FILE NUMBER **##.##**

OWNER: TO BE INSERTED

DATE _____

WEATHER _____

SITE CONDITIONS _____

WATER LEVEL _____

INSPECTOR(S) _____

CHECK ITEM AS INSPECTED	NOTE CONDITIONS AND OBSERVATIONS	NOTE ACTIONS REQUIRED
-------------------------	----------------------------------	-----------------------

___ Benchmark
 • Check for disturbance/vandalism
 • Condition: _____

___ Staff Gage
 • Location: _____
 • Condition: _____
 • Reading: _____
 • Action: _____

___ Stop Logs
 • Location of tool needed to move boards _____
 • Able to be removed: _____
 • Condition: _____
 • Action: _____

___ Security Fence, Access Gate and Gate Valve Locks
 • Check for damage/vandalism
 • Condition: _____
 • Action: _____

___ Walkway and Railing
 • Check for broken welds or other damage
 • Condition: _____
 • Action: _____

___ Signage (Dam warning and portage)

- Condition and Visibility: _____
- Action: _____

___ Gate Valve

- Exercise gate by fully opening, closing and returning to desired position; check for smooth operation and seal
- Condition: _____
- Action: _____

___ Sluice Gate

- Exercise gate by fully opening, closing and returning to desired position; check for smooth operation and seal
- Condition: _____
- Action: _____

___ Trash Rack

- Check for debris and remove if necessary
- Check for broken connections at anchor chains; repair as needed
- Condition: _____
- Action: _____

___ Log Booms

- Check for debris accumulation and remove if necessary
- Check for broken welds, severe rust or other deterioration; repair as needed
- Condition: _____
- Action: _____

___ Concrete Drop Inlet and Headwall

- Check concrete surfaces for cracks, note location and crack widths on sketch and determine how to maintain
- Severe cracking, extreme deterioration or rapid changes require immediate notification to DNR Water Management Engineer
- Condition: _____
- Action: _____

___ Concrete Overflow Spillway

- Check concrete surfaces for cracks; note location and crack widths on sketch and determine how to maintain
- Severe cracking, extreme deterioration or rapid changes require immediate notification to DNR Water Management Engineer
- Condition: _____
- Action: _____

___ Pipes (corrugated metal, concrete, clay, PVC)

- Check for blockage and remove if necessary
- Check for improper alignment
- Check for rust, cracks, deformation and deterioration
- Check pipe for joint deterioration
- Check for settlement around the pipe
- Look up pipe from downstream end and see if there is water leaking into pipe or around the outside of the pipe
- Condition: _____
- Action: _____

___ Upstream Riprap

- Check for wave action erosion
- Elevation/location/extent of riprap _____
- Condition: _____
- Action: _____

___ Downstream Riprap

- Check for stream erosion and scour near the outlet
- Use probe to check depth of scour hole and if undermining occurring
- Condition: _____
- Action: _____

___ Earth Embankment

- Check vegetative cover; embankment should have a suitable cover of grass (< 6 inches tall) with no brush, shrubs or trees; topsoil and re-seed eroded areas as required
- Check for animal burrows; remove animals and backfill holes with soil
- Check for surface erosion on grassed slopes and at riprap flumes which intercept and direct roadway drainage
- Check riprap placement, replace as required
- Check for slumps, slides or sloughing
- Check for settlement of embankment; settlement indicates loss of material or compression of material and may be uniform or at isolated depressions; note locations and size on sketch and contact DNR Water Management Engineer
- Check for seepage on the downstream slope and toe of slope (junction of embankment with natural ground downstream; if seepage contains soil particles contact with the DNR Water Management Engineer
- Condition: _____
- Action: _____

___ Auxiliary Spillway

- Check for evidence of flow through auxiliary spillway, note location of highwater marks on embankment and structure
- Check for displaced riprap and erosion, repair as needed
- Check for woody vegetation such as brush, shrubs and trees within riprap or at edges of riprap; remove as needed
- Check for animal burrows; remove animals and backfill holes with soil
- Condition: _____
- Action: _____

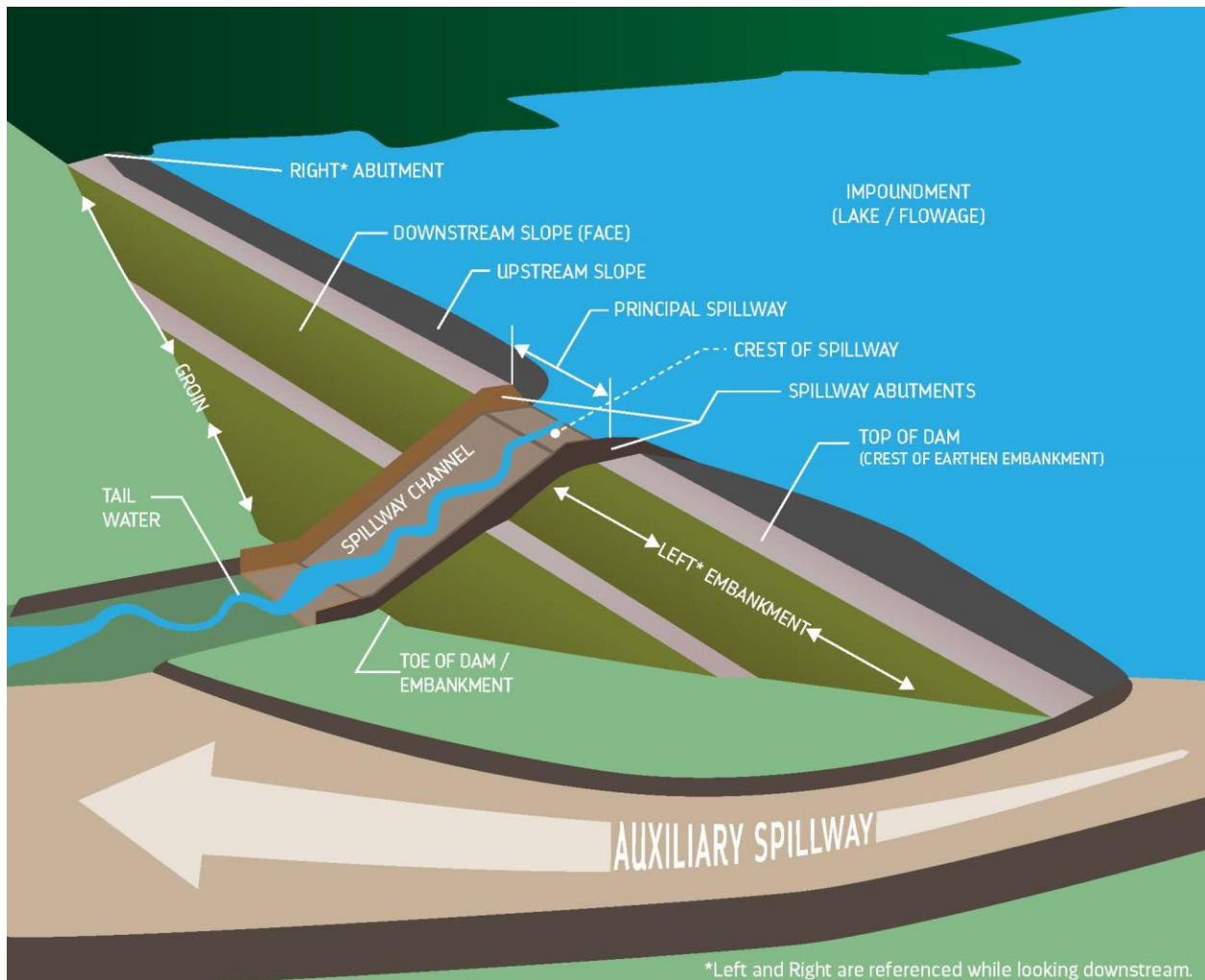
APPENDIX D: DATA SHEETS

Operations Log for ABC Dam						
Date	Time	Inspector(s)	Water Level	Precipitation	Structure Operation	Observations

Equipment Log for ABC Dam				
Date	Time	Equipment	Inspector(s)	Comments
		Mower		

Maintenance Log for ABC Dam				
Activity	Date	Completed by	Action Taken	Comments
Mowing				
Woody vegetation removal				
Debris removal				
Embankment repair				
Riprap replacement				
Lubrication (motor, gate stem)				
Cable/chain repair				
Concrete patching				
Painting				
Signage maintenance				
Fence/lock repair				

APPENDIX E: GLOSSARY OF TERMS



Abutment – That part of the valley side or concrete walls against which the dam is constructed. An artificial abutment is sometimes constructed where there is no suitable natural abutment. The wall between a spillway or gate structure and the embankment can also be referred to as an abutment. (Also see Spillway Abutment)

Alterations – Changes in the design or configuration of the dam that may affect the integrity or operation of the dam and thereby have a potential to affect the safety of persons, property, or natural resources. (Also see Reconstruction)

Appurtenant Works – Structures or machinery auxiliary to dams which are built for operation and maintenance purposes (e.g., outlet works, spillway, powerhouse, tunnels, etc.).

Auxiliary Spillway (Emergency Spillway) – A secondary spillway designed to operate only during large flood events; an auxiliary gate is a standby or reserve gate only used when the normal means to control water are not available or at capacity.

Boil – An upward disturbance in the surface layer of soil caused by water escaping under pressure from behind or under a dam or a levee. The boil may be accompanied by deposition of soil particles (usually silt) in the form of a ring around the area where the water escapes.

Breach – An opening or a breakthrough of a dam sometimes caused by rapid erosion of a section of earth embankment by water; dams can be breached intentionally to render them incapable of impounding water.

Capacity (Hydraulic Capacity) – Amount of water a dam can convey through designed spillway structures, typically expressed in cubic feet per second (cfs).

Conduit – Closed channel (e.g., pipe) to convey the discharge of water through or under a dam.

Core/Corewall – Vertical zone of material of low permeability (e.g., compacted clay) typically in the center of an embankment dam to prevent seepage.

Crest of Dam (Top of Dam) – The top of the dam not designed to flow water; also known as the top of dam.

Crest of Spillway – The top of the spillway where water flows over.

Cutoff Wall – A wall of impervious material (e.g., concrete, asphaltic concrete, steel sheet piling) built into the foundation to reduce seepage through the dam.

Dam – Artificial barrier built for impounding or diverting the flow of water; see NR 333.03(3).

Dam Failure Analysis (DFA) – Analysis completed by an engineer/consultant to estimate the downstream impact if the dam were to fail during a 100-year event; results of analysis used to assign hazard rating. (Also see Hydraulic Shadow Map)

Design Spillway Capacity – The largest storm event or flowrate that a given dam/project is designed to pass safely. The inflow hydrograph (graph showing how inflow to an impoundment changes over time) is used to estimate the amount of water that the spillway needs to convey and maximum water surface elevation of the impoundment.

Dike (Levee/Berm) – An embankment built to protect land from flooding; no water control structure present.

Drain, Layer, or Filter Blanket – A layer of pervious material in a dam to facilitate controlled drainage and reduce seepage velocities; includes toe drain, weepholes, chimney drains, etc.

Drainage Area – The area that drains naturally to a specified point on a river/stream.

Drawdown – Intentional lowering of water surface level due to a controlled release of water from an impoundment; maximum drawdown rate is typically no more than 6 inches per day.

Embankment – A constructed bank of material, commonly earth or rock, to hold back water.

Embankment Dam (Earth Dam/Earthfill Dam) – Any dam primarily constructed of excavated natural materials, usually earth or rock, with sloping sides and a designated water control structure.

Emergency Action Plan (EAP) – A predetermined plan of action to be taken to reduce the potential for property damage and loss of life associated with a dam emergency or failure; EAP includes details specific to each dam.

Energy Dissipater – Device constructed within or at the outlet of a spillway to reduce energy of fast-flowing water.

Engineer/Consultant – Licensed or registered professional engineer (PE) in a given state; offers experience and expertise in the design and inspection of dams.

Face – Upstream or downstream side slope of dam.

Failure – Incident resulting in an uncontrolled release of water from a dam.

Flashboards – Boards, often constructed of wood or steel, used for increasing the depth of water behind a dam that are designed to deploy (break away) at a designed height of water.

Foundation of Dam – Natural material on which the dam structure is placed.

Freeboard – Vertical distance between the upstream water level (headwater) and the top of a dam.

Gate – Device which can be operated across the waterway to control or stop the flow. Common types of gates include slide (sluice), split-leaf, crest, and tainter (radial).

Gravity Dam – Dam constructed of concrete and/or masonry that relies on its weight for stability.

Groin – Area along the contact (or intersection) of the face of a dam with the abutments.

Headwater – Water surface elevation of the impoundment on the upstream side of the dam.

Height of Dam (Structural Height) – Difference in elevation between the point of lowest elevation on the top of the dam before overtopping and the lowest elevation of the natural stream or lake bed at the downstream toe of the dam; see NR 333.03(24).

Hydraulic Height – Difference in elevation between the headwater and tailwater.

Hydraulic Shadow Map – Map delineating the area that would be inundated due to a dam failure during a 100-year flood event; see NR 333.03(8).

Impoundment (Pool/Lake/Reservoir) – Water held back by a dam; water on the upstream side of the dam.

Intake – Any structure in an impoundment which water can be drawn through the dam.

Maintenance – The upkeep necessary for efficient operation and safety of dam and appurtenance works; involves labor and materials but is not to be confused with alterations or repairs.

Ogee Spillway (Ogee Section) – A weir where the spillway crest, slope, and bottom form an "S" or ogee curve.

One percent (1%)/One Hundred Year (100-year)/Regional Flood The regional flood is based upon a statistical analysis of stream flow records available for the watershed or an analysis of rainfall or runoff characteristics in the watershed or both. In any given year, there is a 1% chance that the regional flood may occur or be exceeded.; see NR 333.03(23).

Operator – The owner, designated agent, or employee of the owner charged with overseeing and physically operating the dam.

Outlet – An opening through which water discharges from an impoundment.

Overtopping – Uncontrolled release of water over parts of the dam that are not designed to pass flow; overtopping does not necessarily mean that the dam has failed.

Owner – A person, or group of people (e.g., Lake District), utility, corporation who is responsible for operating, maintaining, and managing a dam.

Phreatic Surface – Upper surface of saturation in an embankment.

Piping – The progressive development of internal erosion by seepage; appears on the downstream side of the dam as a hole or seam where water containing soil particles is discharged.

Plunge Pool (Stilling Basin) – A natural or sometimes artificially created pool that dissipates the energy of free-flowing water.

Primary Spillway (Principal Spillway) – Main spillway designed to convey water during normal flows; see NR 333.03(16).

Reconstruction – Altering an existing dam in a way that affects its hydraulic capacity or structural integrity; see NR 333.03(22).

Repair – Activity to restore a dam to its approved design condition.

Riprap – Large stones placed to protect against wave action, ice action and scour.

Scarp – Nearly vertical, exposed earth surface created at the upper edge of a slide or a breach.

Seepage – Movement of water through the dam foundation, abutments, or embankment.

Slide – Movement of a mass of earth fill down a slope along the failure plane for a considerable distance. In embankments and abutments, this involves a surficial separation of a portion of the slope from the surrounding material.

Slump – A portion of earth embankment which moves downslope, often along a curved surface; sometimes happens suddenly, often with cracks developing.

Spillway – Structure over or through which flows are discharged. If the flow and level are controlled by gates it is considered a controlled spillway, but if the spillway crest is at a fixed elevation (and cannot be changed) it is considered an uncontrolled spillway.

Spillway Abutment – Wall between a spillway or gate structure and the embankment.

Spillway Channel – Channel conveying water from the impoundment to the river downstream.

Stop Log – Logs, timbers, steel beams, or concrete beams placed on top of each other with their ends held in channels/guides/brackets on each side of a channel or conduit; stop logs may be added or removed to raise or lower the impoundment water level.

Storage – Volume of water held behind a dam, typically expressed in units of acre-feet. Maximum storage capacity means the volume of water stored before overtopping occurs; see NR 333.03(11).

Tailwater – The level of water in the discharge channel immediately downstream of the dam.

Toe Drain – Drains installed at the toe of the dam to collect and convey seepage that occurs through embankment.

Toe of Dam (Toe of Embankment) – The junction of the downstream face of a dam with the ground surface, also referred to as the downstream toe. For an embankment dam, the junction of the upstream face with the ground surface is called the upstream toe.

Trash Rack –Metal or concrete bars located in the waterway across the upstream end of a conduit or spillway channel to prevent the entry of floating or submerged debris.

Valve – Device fitted to a conduit in which the closure member is either rotated or moved transversely or longitudinally in the waterway to control or stop the flow.

Weir –A barrier built across the width of a stream to raise the upstream water level; called a fixed-crest weir; when top is at a permanent elevation and cannot be moved up or down. Weirs can also be built across a stream, channel or discharge point to measure or gauge flow. Types of weirs include broad crested, sharp crested, ogee, and V-notched weirs.