Paint Creek Habitat Restoration Dam Removal Project
Clinton River Watershed Council
September 27, 2011 Oakland Township Board Meeting
List of Documentation Provided

Tab A.....Request Highlights
Tab B.....Request for Township Board Approval of Access Agreement
Tab C.....Agreement

Ex. 1 .....Historical and Environmental Grant Opportunities
Ex. 2 .....Mill Race Aerials Showing Location and Private Properties
Ex. 3 .....Mill Race Profile Showing Slope and Sediment Levels
Ex. 4 .....Memo Outlining Historical Impacts Due To Lack of Maintenance
Ex. 5 .....Flow Into Mill Race and Pipe Diameter Diagrams
Ex. 6 .....Pipe Sizing and Flow Data
Ex. 7 .....Cases Regarding Dam Owner's Responsibility to Maintain Water Surface Elevations (or Lack Thereof)
Ex. 8 .....Dam Ownership Responsibilities
Ex. 9 .....MDEQ/MDNR Lawsuits Against Dam Owners
Ex. 10 .....Professional Evaluation of Existing Dam Condition
Ex. 11 .....Dam Safety Legislation
Ex. 12 .....Previous Dam Failure Information
Ex. 13 .....Legal Liability for Dam Failures Analysis
Ex.14 .....Additional Information Including Dam Owner Responsibility/Liability, Failures, Operations, Maintenance, etc.

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Project Highlights

To facilitate the request to remove the dam, CRWC has provided all information and performed all tasks requested by the Township Board, including:

- Resident Notification – Complete, weekly updates where provided
- SHPO No Adverse Impact – Complete, provided
- MDEQ Permit – Complete, provided
- Engineering Study – Complete, provided
- Public Hearing – Complete including public information meeting
- **Funding for Mill Race Sediment Removal – Provided information herein**
- **Liability Concerns – Provided information herein**

Funding for Mill Race Sediment Removal

Background - The Mill Race flow issue is a result of the continued sediment deposition in the Mill Race. The Mill Race is unable to convey water the way it once did due to deposition of sediment in the channel that forms the Mill Race. This ***deposition will continue to occur*** as the grade of the channel is so flat, it is unable to transport sediment and will always function as a settling basin. The solutions to this problem are to raise the dam elevation and thus causing further damage to upstream properties and stress the integrity of the dam or dredge the Mill Race. The Township and adjacent residents will face this problem, with or without the project.

Funding – EPA denied our request in increase our current grant funding to cover the clean out of the Mill Race citing its definition as a historical feature rather than an environmental feature. The CRWC commits to applying for 2 grants in the upcoming year to fund Mill Race improvements. Many questions remain such as who is the fiduciary, who pays the local match, will easements be granted, will the aesthetics appeal to the adjacent property owners, etc. These matters will take time to address and may never be resolved.

Approval for the dam removal project, with 100% funding already in place, should not be unnecessarily withheld while other possible funding sources are sought.

Liability Concerns

Background – Dam owners are responsible for the maintenance, security, and operations of their dam. Dams, like any structure, deteriorate over time. When this deterioration crosses the critical threshold and flow conditions stress the dam, catastrophic failure is likely to occur resulting in litigation for loss of life or property, injury, and/or environmental degradation.

Liability –The Township will need to spend tax payer funds on improving, maintaining, securing, and operating the dam regardless of legal definitions of liability. Does failure to perform any of these duties diminish the Township's available defenses should a liability lawsuit be leveled against the Township due to an issue with the dam? The proposed project eliminates this Township responsibility, any costs, and any possible liability.

The Township is in a unique position. The Township's responsibility for the dam can be removed, at no cost to the Township, in an environmentally appropriate way. Regardless of specific legal liability defenses, the Township's management of risk should welcome the removal of the dam.

September 23, 2011

Board of Trustees
Charter Township of Oakland
4393 Collins Road
Rochester, MI 48306

RE: Request for Approval of the Access Agreement
Paint Creek Habitat Restoration Dam Removal Project
Clinton River Watershed Council

Dear Oakland Township Board of Trustees

At the 9/13/11 Township Board Meeting, the Clinton River Watershed Council's request for Township approval of the access agreement to enter upon Township property to remove the dam was tabled. The tabling motion included two concerns:

1) Township Liability related to owning, maintaining, and possibly during failure of the dam; and
2) Funding for the clean out of the Mill Race due to the reduction (not elimination) of water flowing into the Mill Race after the dam is removed.

The CRWC, consultant team, and technical advising committee have endeavored to provide the Township with factual information regarding all aspects of the project. Further, we have made an effort to avoid publicly disputing resident allegations and falsehoods, instead relying on the technical information provided to the Township by our team of experts. For sake of Township Board and Public clarification, we now feel that it is important to formally summarize our responses to the above and provide supporting documentation for the Board to have the correct information for consideration of our request. Enclosed is this information. Our presentation at the 9/27/11 Board meeting will generally follow and highlight the key points of this information in the following order:

Grant Opportunities

As mentioned at the 9/13/11 Board Meeting, the CRWC offered to participate in the solution of restoring the Mill Race by seeking grant monies for the removal of the accumulated sediment that is obstructing flows (with or without the dam removal project). This commitment is conditional upon the approval of the agreement. We approached our grantor, EPA, with a request to expand our scope and project costs to include work on the Mill Race. EPA cited the very specific nature of our grant, habitat restoration, in their verbal denial of additional funding for the purpose of cleaning out the Mill Race.

Ex. 1 is tables of both historical and environmental grants that may be available in the upcoming months. As part of our agreement with the Township, the CRWC will make application for up to 2 of these grants and support the project. However, this will require the Township or another party to be fiduciary of the grant. Further, the Mill Race is located on private properties and any cleanout will only benefit the adjacent property owners, see Ex. 2. The adjacent property owners will have to provide

easements for the construction work needed to undertake the grant. Furthermore, any local match required for the grant should come from the Township, the Historical District Commission, or by a Special Assessment on the benefiting property owners. It appears that the adjacent residents have provided enough support for the value they place on the Mill Race to define a direct benefit suitable to assess these residents under Public Act 188 for project costs or for a local match to clean out the Mill Race.

Approval for the dam removal project, with 100% funding already in place, should not be unnecessarily withheld while other possible funding sources are sought.

Mill Race Sediment

Ex. 3 shows the Mill Race at the divergence from Paint Creek to the pipe input back into the creek. When the Mill Race was disconnected from the Mill, an outlet pipe was installed 1.8 feet below the inlet pipe to the Mill Race 2,400 feet away. The resulting slope is 0.075% or less than 1" over 100 feet not including the general slope impacts due to driveways, culverts, woody debris, etc. The minimum roadside ditch slope to drain water and not deposit sediment is 0.4% or 4.8" over 100 feet or 5 times more steep as existing. The Mill Race cannot sustainably manage the suspended sediment inherent in its receiving water and the sediment will continue to deposit in the channel Flow in the channel will remain restricted until such time as more boards are added to the dam or the Mill Race is properly maintained by the residents by removing the sediment.

Trash Rack at Gallagher Road End of Mill Race Obstructing Flow

The inherent lack of slope in the Mill Race channel coupled with any obstruction such as a felled tree, trash rack, or improperly placed or maintained driveway culvert will slow the flow of water. This condition also warms up the water and collects pollutants such as fertilizers, herbicides, sediment, runoff from vehicle areas, etc. which then degrades the Paint Creek upon reconnecting to the Creek. Urban drains or streams such as the Mill Race require ongoing comprehensive maintenance even at proper slopes or they will continue to fill in as is occurring today. To our knowledge, neither the Township nor the adjacent property owners have undertaken any maintenance on the Mill Race to maintain flows. The proposed project matches the current inlet grades thus will not diminish the potential of the Mill Race to be dredged to its historical elevation and slope.

Another issue of concern involves the impact that Mill Race maintenance, or lack thereof, and dam height increases may have on the historical designation of the Mill Race. Ex. 4 is a memo from our Historical consultant. It explains that if historical elements are neglected and the dam height is increased, the millrace may cease to be eligible for the National Register of Historic Places. Therefore, the designation of those historical elements could be subject to challenge by an affected property owner wishing to fill or modify the Mill Race and thus invalidating the historical designation itself. In other words, as the Mill Race continues to fill with sediment further restricting flow, one of the property owners, through which the Mill Race flows, could fill the channel, permanently blocking flow, and the other property owners would be unable to prevent it from happening from a historical perspective. Part of maintaining historical significance is proactively managing the element to preserving its integrity.

Debris Obstructing Flow at Head of Mill Race

Submerged 36" Culverts

It appears, the CRWC is being asked to perform the duties that responsible property owners and good stewards of the water resource should have been doing.

Ex. 4 is an expanded view of the control structure at the upstream end of the Mill Race. For water to enter the Mill Race today (and even in the future without sediment removal), the water surface elevation upstream of the pipes has to be higher than the sediment. If the creek elevation is lower than this or, the area between the control structure and the river obstructs flows, water cannot reach this elevation and thus the Mill Race will dry out.

The current 36" diameter culverts are submerged under the sediment by 3.6'and are partially blocked off by the gates that are covering ~80-90% of the pipe entrance. Therefore, current flow levels have very little to do with the size of pipe. Our consultant team took detailed measurements of flows, velocity, areas, etc. and modeled the current flows into the Mill Race with the boards in place. They found that approximately 10% of the river flow makes it into the Mill Race. This is shown in Ex. 5. Our project matches this flow using an 18" pipe that provides the same amount of flow as exists today. Coincidentally, from a resource preservation standpoint, the ecology of Paint Creek starts to be impacted if more than 10% of the flows are taken out of the Creek.

Slide Gates at Control End of Existing 36" Culverts

The dam removal project will lower the creek elevation and thus the Mill Race will be dry more often than existing. 15% of flows in the Creek will still generate flow into the Mill Race under current conditions.

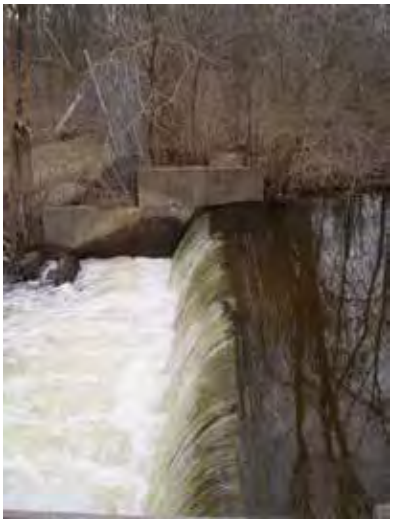
We don't believe the tremendous benefit of the Paint Creek from a property value, economic, environmental, and resource to the Township and entire region is in question or should be degraded in order to appease 5 property owners who have not maintained their portions of the Mill Race.

In discussing this project with MDNR and MDEQ experts, they provided several legal documents that discuss the responsibly of dam owners to maintain artificial water levels. We will defer to the Township Attorney related to the specific legal aspects. However, we have included these documents as Ex. 6 to show the Township Board that you likely do not have a legal obligation to maintain upstream water elevations, which is what is being asked of the Township by the adjacent property owners to the Mill Race. However, with proper maintenance of the Mill Race, the proposed dam removal project is designed to ensure similar flows.

The Township and CRWC are going above and beyond the dam owner's obligations to ensure flows by maintaining upstream water surface elevations so the Mill Race will continue to receive water, intermittently until the sediment is removed.

Liability

We understand that liability in the legal sense depends on many factors as stated by the Township Attorney at the meeting. We will defer the legal definition of the Township's liability to the Township Attorney. However, the Township owns the dam and property the dam sits on. It is a Township facility. As with all Township property, the Township has a responsibility for the dam including maintenance, security, operations, etc. (Ex. 6). Does failure to perform any of these duties diminish the Township's available defenses should a liability lawsuit be leveled against the Township due to an issue with the dam? Please note that lawsuits could be initiated over water rights, property flooding, property losses, injury, loss of life, or environmental impacts (fish kills, sediment releases, or degradation of downstream habitat, see Ex. 7). According to the Dam Safety Division of MDEQ, their office has seen a significant increase in municipal insurance carriers checking with their office on status of dams within their insured's jurisdiction.



Erosion Along Northerly Dam Wall

The Township has been previously put on notice that there are maintenance issues with the dam. Ex. 8 is a report forwarded to the Township from professional engineers indicating there are numerous concerns with the dam. The estimated cost to remedy these items is $50,000. Annually, inspections and maintenance were estimated at $5,000 per year.

Is the Township prepared to budget for the ongoing maintenance of the dam?

The operation of dam has thus far been left to an adjacent resident(s). Has this person received the proper training and Township clearances to manage the dam property? Do they follow safety protocols? Our analysis of the current dam operations, namely the boards, showed that the boards have created a detrimental backwater conditions ***including increased flooding on the properties upstream of the dam***. The influence of the impoundment, with the boards in, extends to north of Gunn Road. In this area, the stream deposits sediment at the confluence of the backwater. This sets off a

reaction of deposition which causes adjacent stream bank failures, and additional flooding. Further, the boards create additional sediment and hydrostatic pressure on the dam and higher energy creating downstream erosion. Installing, removing, or manipulating the boards requires a MDEQ Permit. Has the Township applied for this permit?

Upstream Flooding Conditions – Exacerbated by Boards on Dam

It is the professional opinion of our experts that the boards have caused upstream property damage by excess and/or more frequent flooding and loss of property by erosion. The proposed project will reverse these impacts and improve the Creek through this area.

The Dam Safety Act was established to prevent property damage and loss of life in the event a dam fails. This Act and the Emergency Action Plan requirements focus on catastrophic failure. Dams, like any structure, deteriorate over time. Concrete weathers, tree roots grow through the dam, timbers degrade, water pipes thru the earthen dam portions, etc. When this deterioration crosses the critical threshold and flow conditions stress the dam, catastrophic failure is likely to occur. Dams deteriorate slowly over decades but typically fail in minutes or hours. Dam Safety Act info is in Ex. 8

There is approximately 3.5 feet of water standing behind the dam, mainly in the half mile stream length to Gunn Road. If this water is suddenly released, it has an awesome amount of force that it will direct at stream banks, properties, structures, and other dams downstream. There is some evidence that the Lake Orion dam failed in the 1940-50's that corresponds to the subject dam being rebuilt, Ex. 9.

We have included dam failure literature for the Township Board's consideration when thinking of both liability and responsibility. As stated in Denis Binder's "Legal Liability for Dam Failures" attached as Ex. 10, liability from a legal sense may not exist, but litigation is likely to occur and the Township would be targeted as the owner of the dam.

> *"…in today's litigious society it is safe to assume that in the case of a catastrophic dam failure, extensive litigation will ensue. Any competent lawyer, representing the victims, will sue all possible wrongdoers in seeking redress. Lawsuits will therefore most probably be filed against everyone remotely connected to the dam's existence, including the architects, engineers, contractors, sub-contractors and consultants involved in the original construction, as well as those responsible for any subsequent modifications. Potential defendants would clearly include the owners and operators of the facility, quite possibly the state engineer or private dam safety inspectors, and conceivably any insurance company which performed a safety inspection of the facility."*

The Township is in a unique position. The Township's responsibility for the dam can be removed at no cost to the Township in an environmentally appropriate way. Regardless of specific legal liability defenses, management of risk principals welcomes the removal of the dam.

Addition information is presented in Ex. 11

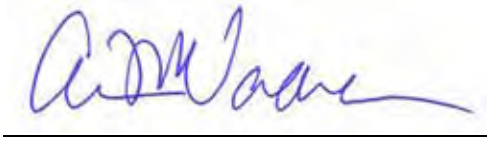
Summary

Over the past several years, the Clinton River Watershed Council has diligently pursued all necessary approvals including, MDEQ, SHPO, and other agencies. All that remains is the Township's approval to access Township property for the removal of the dam. We appreciate the Township Board's consideration of this request. Oakland Township and the greater watershed area will benefit greatly from this project.

We hereby request Township Board approval of the agreement as submitted. The agreement has been revised per our comments at the last meeting and includes the additional grant conditions as stated above.

Very Truly Yours,

Clinton River Watershed Council



Anne Vaara, Executive Director

Pc: Oakland Township; Mr. Jim Creech, Mr. Steve Joppich
HRC; Mr. Keith McCormack, Mr. Jamie Burton
Technical Advisory Committee
CRWC; files

AGREEMENT PROVIDING PERMISSION AND CONSENT TO ENTER ONTO TOWNSHIP PROPERTY TO UNDERTAKE THE PAINT CREEK DAM REMOVAL PROJECT

The Charter Township of Oakland, whose address is 4393 Collins Road, Rochester, Michigan 48306-1670 (hereinafter "the Township"), being title holder to the following described land, to-wit:

Sidwell Number 10-25-126-009 or T4N, R11E, SEC 28 SUPERVISOR'S PLAT NO 1 LOTS 1, 5 & THAT PART OF LOT 8 LYING W OF N & S ¼ LINE

does hereby grant to the Clinton River Watershed Council, whose address is 1115 W. Avon Road, Rochester Hills, Michigan 48309 (hereinafter "Watershed Council"), its non-exclusive and temporary permission and consent to enter onto the Property for purposes of undertaking the Paint Creek Habitat Restoration Dam Removal Project referenced and described in the Permit attached as Exhibit "A" hereto and incorporated herein issued by the Michigan Department of Environmental Quality (the "MDEQ"), subject to all of the following conditions:

(1) The Watershed Council must obtain all necessary federal, state and local approvals, including without limitation the necessary permit from the MDEQ and finding of no adverse impact from the State Historical Preservation Office (the "SHPO");

(2) The Watershed Council must fully comply with all federal, state and local approvals, permits, grants, and all conditions of such approvals, permits and grants, including without limitation the MDEQ and the SHPO;

(3) The Watershed Council must fully comply with all applicable federal, state and local ordinances, laws, regulations, policies, and standards;

(4) The dam shall be removed in a manner that will preserve the Historical Significance and marker for the Mill Race including maintaining flows that are necessary for this;

(5) The premises shall be reasonably restored to a condition as good as that which existed before the construction including but not limited to the access road;

(6) Refuse, spoils, and waste materials shall be handled and disposed of by the Watershed Council as required by all applicable federal, state, and local laws, rules and regulations;

(7) The Paint Creek Habitat Restoration Dam Removal Project shall be undertaken at no cost to the Township;

(8) The temporary permissive rights set forth herein shall automatically terminate upon the first to occur of either the completion of said Paint Creek Habitat Restoration Dam Removal Project, or two (2) years after the date of the notarization of the Township's execution of this instrument;

(9) The Clinton River Watershed Council will at their expense apply for two (2) grants for the cleanout and restoration of the Mill Race within one (1) year or upon completion of their grant. The CRWC shall not be fiduciary on the grant applications and not be responsible for the local match funding, if any. Further, this shall not be construed as a guarantee of grant

funds. The CRWC shall endeavor to obtain funds by putting forth a reasonable and good faith effort into the applications, supporting the project, and seeking support through their project partners.

(10) Compliance with all of the terms set forth in this instrument;

(11) _____

(12) _____

The Watershed Council agrees that it and its contractors shall comply with all of the above conditions. Furthermore, to the fullest extent permitted by law, the Watershed Council agrees to defend, pay on behalf of, indemnify, and hold harmless the Township, its elected and appointed officials, employees and volunteers, and others working on behalf of the Township, from and against any and all claims, demands, suits, or loss, including all costs connected therewith, and for any damages which may be asserted, claimed, or recovered against or from the Township, by reason of personal injury, including bodily injury or death, and/or property damage, including damage to or loss of use thereof, which arises out of, or is in any way connected or associated with this Agreement, the Paint Creek Habitat Restoration Dam Removal Project, or which arises out of any occurrences on the Property or the acts or omissions of the Watershed Council or its agents, contractors, consultants, officers, members, directors, managers and/or employees.

The Watershed Council shall also, at its own cost and expense, maintain the insurance policy coverages and provisions described in the insurance requirements attached as Exhibit "B" hereto and incorporated herein in full force and effect at all times for the duration of the Township's permission set forth above. The Watershed Council shall provide the Township with proof of said insurance by way of a signed certificate of insurance coverage issued to the Township as the certificate holder, upon execution of this instrument and at any time the Township requests such proof thereafter. Failure to provide this proof or to maintain the above insurance coverage, at any time, for the period of time required above shall be considered a material breach of this Agreement.

Unless otherwise expressly provided herein, no waiver by any party of any provision hereof shall be deemed to have been made unless expressed in writing and signed by the waiving party. No delay or omission in the exercise of any right or remedy accruing to any party upon any breach under this Agreement by the other party shall impair such right or remedy or be construed as a waiver of any such breach theretofore or thereafter occurring. The waiver by either party of any breach of any term, covenant or condition herein stated shall not be deemed to be a waiver of any other term, covenant or condition. All rights or remedies afforded to the parties hereunder or by law shall be cumulative and not alternative, and the exercise of one right or remedy shall not bar other rights or remedies allowed herein or by law.

It is declared that the actions of the Township under this Agreement are a governmental function. It is the intention of the parties hereto that this Agreement shall not, in any manner, be construed to waive the defense of governmental immunity, which the Township possessed prior to the execution of this Agreement.

Any waiver by the Township of any default or breach of this Agreement shall not be construed to be a continuing waiver of said default or breach, or as a waiver or permission, express or implied, of any other or subsequent default or breach.

This Agreement is governed by, subject to, and construed according to the laws of the State of Michigan. Any action relating to the validity, construction, interpretation and enforcement of this Agreement shall be filed with jurisdiction and venue stipulated as being in Oakland County, Michigan.

This Agreement is not intended to confer any benefit on any person or entity that is not a party to this Agreement.

If any paragraph, sentence, clause, phrase or portion of this Agreement is for any reason held invalid or unconstitutional by any court of competent jurisdiction, that portion shall be considered a separate, distinct and independent portion of this Agreement, and the remaining portions of this Agreement shall remain in full force and effect.

This instrument shall be binding and inure to the benefit of the parties hereto, their heirs, representatives, successors, contractors and permitted assigns.

CHARTER TOWNSHIP OF OAKLAND

By: _____
Joan Fogler, Its Supervisor

By:_____
Judy Workings, Its Clerk

CLINTON RIVER WATERSHED COUNCIL

By: _____
_____, Its _____

COUNTY OF OAKLAND)
) ss.
STATE OF MICHIGAN)

The foregoing instrument was acknowledged before me on this __ day of _____, 2011, by Joan Fogler, the Supervisor, and Judy Works, the Clerk, of the Charter Township of Oakland.

_____
Notary Public
Acting in Oakland County, Michigan
My commission expires: _____

COUNTY OF OAKLAND)
) ss.
STATE OF MICHIGAN)

The foregoing instrument was acknowledged before me on this __ day of _____, 2011, by _____, the _____, of the Clinton River Watershed Council.

_____
Notary Public
Acting in Oakland County, Michigan
My commission expires: _____

1690758_2.DOC

HopkinsBurns
DESIGN STUDIO
historic preservation & communities by design

Paint Creek Millrace
Potential Grant Sources

The following grant programs potentially could provide all or partial funding for restoration of the Paint Creek Millrace through dredging. These grants come from a variety of sources, including soil erosion, watershed protection, and historic preservation programs.

It is important to note that many of these grants are only available to non-profit organizations. The supporters of the millrace may wish to consider forming a non-profit organization to preserve and maintain the Paint Creek Millrace should another entity such as the Township, Historic District Commission, or Historical Society not take a lead role. Presumably, the ownership of the millrace property would have to be legally conveyed to the non-profit entity. The details of formation of this type of organization and the legal aspects of the millrace ownership should be further investigated and legal advice should be obtained.

Some grants are only available to Certified Local Governments (CLG). Check with the local Historic District Commission to determine of Oakland Twp is a CLG. CLGS may sponsor a project for a non-profit or other public entity, and obtain grant money on their behalf.

Some grants indicate amounts available, others are silent on amounts.

Great Lakes Commission, Great Lakes Basin Program for Soil Erosion and Sediment Control

Federally financed through the Farm Bill, this funding source supports soil erosion and sediment control projects throughout the Great Lakes basin. Project cost match required of 25% and project awards are at three levels, up to $40,000 for small scale projects; up to $75,000 for large scale projects; and up to $125,000 for watershed scale projects. Contact Gary Overmier with the Great Lakes Commission in Ann Arbor, at 734-971-9135 or garyo@glc.org or http://www.glc.org/basin.

Five Star Restoration Challenge Grants Program

The National Association of Counties, the National Fish and Wildlife Foundation, and the Wildlife Habitat Council, in cooperation with the U.S. Environmental Protection Agency (EPA), the Community-Based Restoration Program within NOAA Fisheries, and other sponsors (e.g., Office of Surface Mining), are pleased to solicit applications for the Five Star Restoration Challenge Grants Program. The Five Star Restoration Program provides modest financial assistance on a competitive basis to support community-based wetland, riparian, and coastal habitat restoration projects that build diverse partnerships and foster local natural resource stewardship through education, outreach and training activities. In 2004, 50 projects received grants of on average $10,000 out of approximately 180 applications received. For more information on the Five Star Restoration Challenge Grant Program, how to apply, and examples of past Five Star projects, visit the website http://www.naco.org/fivestar\ or contact Jason Shedlock at (202) 942-4252 or jshedloc@naco.org.)

4709 N. Delhi Road, Ann Arbor, Michigan 48103
T| 734.424.3344 F| 734.864.5746

The Hart Family Fund for Small Towns

Assists small town preservation and revitalization initiatives around the country. The fund focuses on towns with populations of 5000 or less, and grants range from $5000 to $10,000. Contact the National Trust for Historic Preservation Midwest Office
Royce Yeater, Director
Phone: 312-939-5547
Fax: 312-939-5651
mwro@nthp.org
www.preservationnation.org/midwest

The Johanna Favrot Fund for Historic Preservation

Fund provides nonprofit organizations and public agencies grants ranging from $2,500 to $10,000 for projects that contribute to the preservation or the recapture of an authentic sense of place. Individuals and for-profit businesses may apply only if the project for which funding is requested involves a National Historic Landmark. Funds may be used for professional advice, conferences, workshops and education programs. The Johanna Favrot Fund has an annual deadline of February 1, and an application for the February 2012 round will be available online in fall 2011. Contact the National Trust for Historic Preservation Midwest Office
Royce Yeater, Director
Phone: 312-939-5547
Fax: 312-939-5651
mwro@nthp.org
www.preservationnation.org/midwest

Society for the Preservation of Old Mills (SPOOM)

SPOOM is accepting grant applications once again, for mill related projects that are supported by a non-profit organization and, that are open to the public, or from individuals doing research into mills and milling operations which would also be of benefit to SPOOM members and the general public. Grants will be considered for specific requests such as interpretive signs, small repair jobs, brochures, publications, landscaping, materials purchase and research. Grants will also be considered for those needing funds to match other local, state or federal grant programs.

SPOOM grants are intended to be 50-50 matching grants. Recipients are required to show dated proof of payment for completed services and photographs (or a copy of written material) after which SPOOM will reimburse the recipient 50%, of agreed upon expenses.

To be considered for 2011, all grant requests must be received by the vice president no later than September 1, 2011. At that time, all requests will be considered collectively. Awards will be announced at the annual convention in September. Please type your application. Grant recipients must be SPOOM members in good standing.

Send applications to: Ivan Lufriu, 458 Mud College Rd., Littletown, PA 17340, 717 359-4363
Ivamar@netzero.net
http://www.spoom.org/spgrant.html

The Kinsman Foundation

Historic preservation has been our principal funding area since our beginning. In 2006 we identified our primary interest in this area as architectural preservation — the preservation, rehabilitation, restoration and reconstruction of historic buildings, structures and related sites. Most of the projects we fund involve buildings that are listed in the National Register of Historic Places, either individually or as a contributing resource in an historic district.

We will continue to consider grants for other historic preservation activities as a secondary interest.

For 2011, Historic Preservation grants are budgeted for approximately one-quarter of our total grants, about $275,000.

http://kinsmanfoundation.org/guidelines/eligibility.htm
Telephone 503-654-1668
Fax 503-654-1759
Email: grants@kinsmanfoundation.org

Michigan Historic Preservation Grant

The purpose of the CLG grant program is to help local communities develop or strengthen their historic preservation program. CLG grants can be used to identify, register, rehabilitate, and protect resources that are listed in or eligible for listing in the National Register of Historic Places. The grants can also be used for preservation planning and education. A 40% match is required for this grant.

Federal funding is allocated to SHPO. Of that funding, 10% is subgranted by the state to CLG's. Only Michigan Certified Local Governments (CLG) can apply for this grant. CLG's may sponsor projects for non-profit organizations and public entities within their jurisdiction.

A maximum of $80,000 is available. It is not clear if this amount can be awarded to a single project, or if the $80,000 is distributed among multiple applicants throughout the state.

Application information is available in the early summer in the grant manuals; applications are due December 1. Contact: Denise Sachau Email: dsachau@michigan.gov Phone: (517) 373-1904

Grant Eligibility

Grant Program	Funding Source	Amount Available	% Match	Submittal Deadline	Comments
CMI/319 NPS Implementation	MDEQ	$1,000,000	25%	Varies Annually	1) CMI-319 Approved Watershed Management Plan Needed 2) NOI forms submitted
Sustain Our Great Lakes – Community Grant	Sustain Our Great Lakes	$25,000 to $150,000	>50%	2012 – not announced yet	
Sustain Our Great Lakes – Stewardship Grant	Sustain Our Great Lakes	$150,000 to $1,500,000	>50%	2012 – not announced yet	
Great Lakes Basin Fish Habitat Partnership	USFWS	$500,000	50%	10/14/11	Max. recommended $200,000; habitat restoration focus

CLINTON RIVER WATERSHED COUNCIL

HRC
HUBBELL, ROTH & CLARK, INC
Consulting Engineers

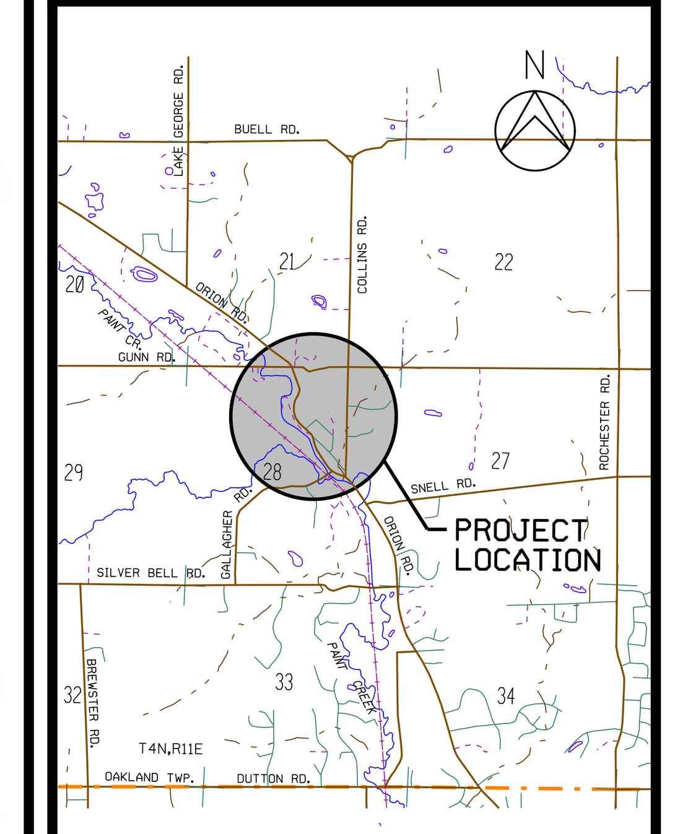
555 HULET DRIVE
BLOOMFIELD HILLS, MICH.
P.O. BOX 824
48303 – 0824

PHONE: (248) 454-6300
FAX (1st. Floor): (248) 454-6312
FAX (2nd. Floor): (248) 338-2592
WEB SITE: http://www.hrc-engr.com

DATE	ADDITIONS AND/OR REVISIONS
8-8-11	ISSUED FOR BIDS
8-3-11	ISSUED FOR RCOC PERMIT
7-12-11	REV. PER MDEQ-PCU PRE APP. COMMENTS
7-8-11	ISSUED FOR MDEQ PERMIT No. 1

DESIGNED	J.F.B.
DRAWN	J.A.R.
CHECKED	J.F.B.
APPROVED	K.D.M.

V:\201101\20110115\C\03_c080_accessplan.dgn



PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

ACCESS PLAN

NOTICE:

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or 811
(TOLL FREE)
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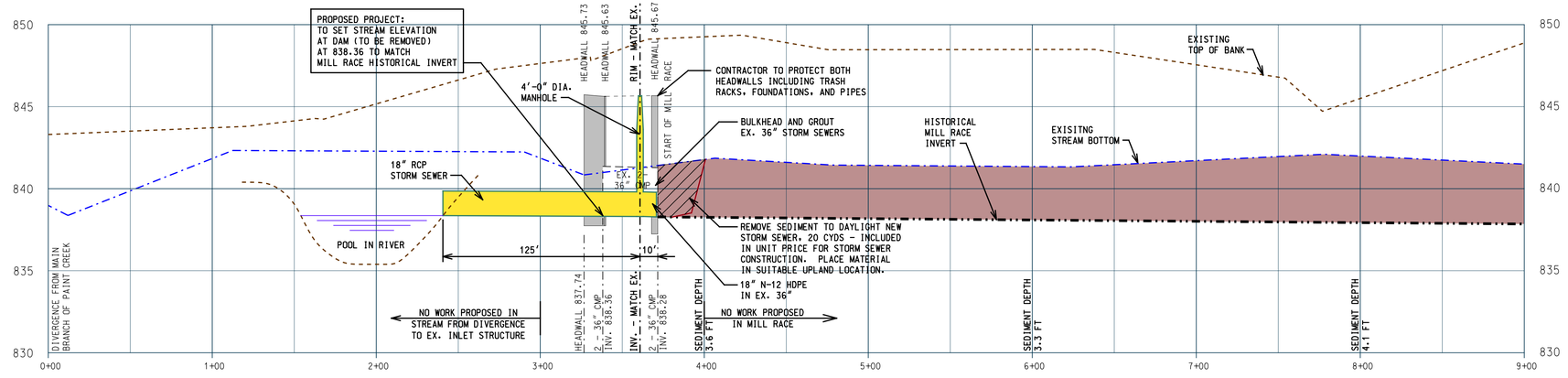
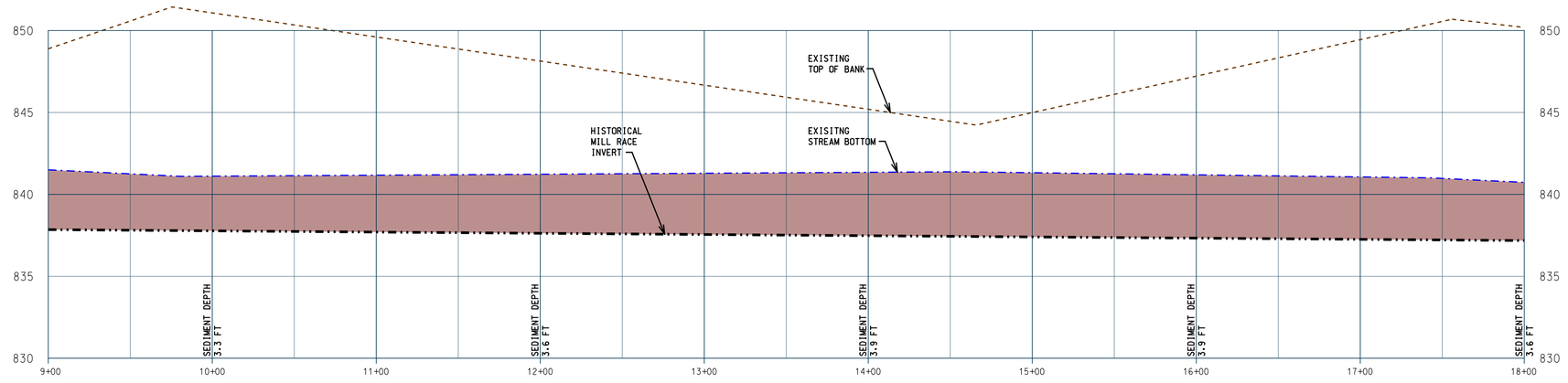
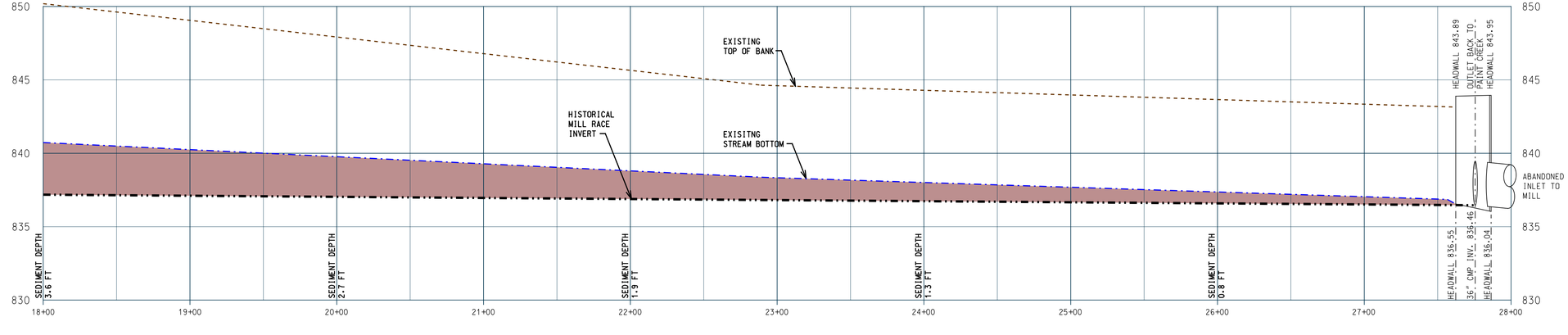
HRC JOB NO.	SCALE
20110115	1" = 80'
DATE	SHEET NO.
MARCH 2011	03 OF



SCALE: 1" = 40' HOR.
1" = 4' VERT.



SCALE: 1" = 40' HOR.
1" = 4' VERT.



SCALE: 1" = 40' HOR.
1" = 4' VERT.

NOTES:

1. NO WORK IS PROPOSED IN THE MILL RACE FROM STA. 4+00 TO STA. 28+00
2. HEADWALLS AND PIPES AS SHOWN TO REMAIN.

NOTE:

SEE SHEET 03 (ACCESS PLAN) FOR PLAN VIEW OF MILL RACE

CLINTON RIVER WATERSHED COUNCIL

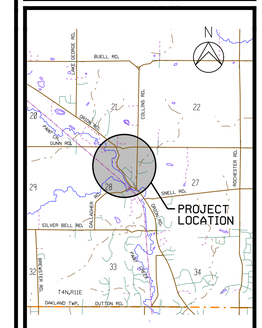
HRC
HUBBELL, ROTH & CLARK, INC
Consulting Engineers

555 HULET DRIVE P.O. BOX 824
BLOOMFIELD HILLS, MICH. 48303 - 0824

PHONE: (248) 454-6300
FAX (1st. Floor): (248) 454-6312
FAX (2nd. Floor): (248) 338-2592
WEB SITE: http: // www.hrc-engr.com

8-8-11	ISSUED FOR BIDS
8-3-11	ISSUED FOR RCOC PERMIT
7-12-11	REV. PER MDEQ-PCU PRE APP. COMMENTS
7-8-11	ISSUED FOR MDEQ PERMIT No.1
DATE	ADDITIONS AND/OR REVISIONS
DESIGNED	J.F.B.
DRAWN	J.A.R.
CHECKED	J.F.B.
APPROVED	K.D.M.

V:\2010\20100115\C\06_c040_millraceprof.dgn



PAINT CREEK HABITAT RESTORATION DAM REMOVAL

OAKLAND COUNTY MICHIGAN

MILL RACE PROFILE

HRC JOB NO. 20110115	SCALE 1" = 40' HOR. 1" = 4' VERT.
DATE MARCH 2011	SHEET NO. 06 OF

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HopkinsBurns
DESIGN STUDIO
historic preservation & communities by design

September 20, 2011

Mr. James Burton, P.E.
Hubbell, Roth and Clark, Inc.
555 Hulet Drive
P.O. Box 824
Bloomfield Hills, MI 48303-0824

E-mail copy only.

Re: Paint Creek Habitat Restoration and Dam Removal
Additional Historical Considerations

Dear James,

As you know, the Michigan State Historic Preservation Office (SHPO) concurred with the finding of No Adverse Effect on historic resources contained in our Section 106 review application for the Paint Creek Habitat Restoration Dam Removal Project. At the Oakland Township Board of Trustees meeting last week, there was discussion about the possibility of leaving the dam in place, maintaining the current water elevation and raising water height to maintain the current flows in the Paint Creek millrace when the sediment levels increase thus restricting flows. We have reviewed the potential impact of this action on historic resources in the area, specifically focusing on the millrace, since it is an item of concern on the part of residents. Our analysis and opinion follows.

BACKGROUND

As stated in the Section 106 submittal, the millrace is filled with silt to a depth of over 3 feet due to long-term abandonment and lack of maintenance. As a result, the dam's original height (without boards) will no longer maintain continuous water flow in the millrace. Recently, water flow in the millrace has been maintained by modifications to the dam, consisting of adding planks to the top to raise its height and raise the water level behind it so water can be forced through the head gate into the millrace and over the sediment.

ANALYSIS

It is my understanding from the engineering information provided, that flowing streams naturally carry sediment, and deposit it where water flows slowly. Due to the shallow slope between the headgate and the end of the millrace, water would be flowing so slowly that it could not continue to carry its sediment load even in its original depth/elevation configuration. Thus, ongoing sediment deposition in the millrace would still occur even if the millrace were at full flow as it was when the grist mill was in operation. Periodic dredging and ongoing maintenance would have been required as maintenance to keep water flowing at a rate and volume adequate to power the mill.

It is also my understanding that raising the height of the dam to maintain water in the millrace will continue to result in deposition of silt in the backwater channel upstream of the headgate, as well as in

the millrace. It would appear that without dredging, an endless cycle of dam raising, silt deposition, loss of water in the millrace, and more dam raising would ensue.

Without dredging, the continued deposition of silt would eventually fill the millrace, and it would cease to be a recognizable feature. In addition, the continued raising of the dam height and water level to account for silt buildup would eventually cause the water level to exceed the height of the millrace banks, at which point it would spread out and cease to be recognizable as a millrace .

IMPACT ON HISTORIC INTEGRITY

National Register eligibility is based not only on the history of a site, but also on its integrity. Integrity is the ability of a site to convey its history, feeling, and setting through its surviving visible elements. In effect, integrity means that if there was something there that was historic, enough must remain to convey the physical character that existed during its period of significance. Sites lacking integrity are not eligible for the National Register.

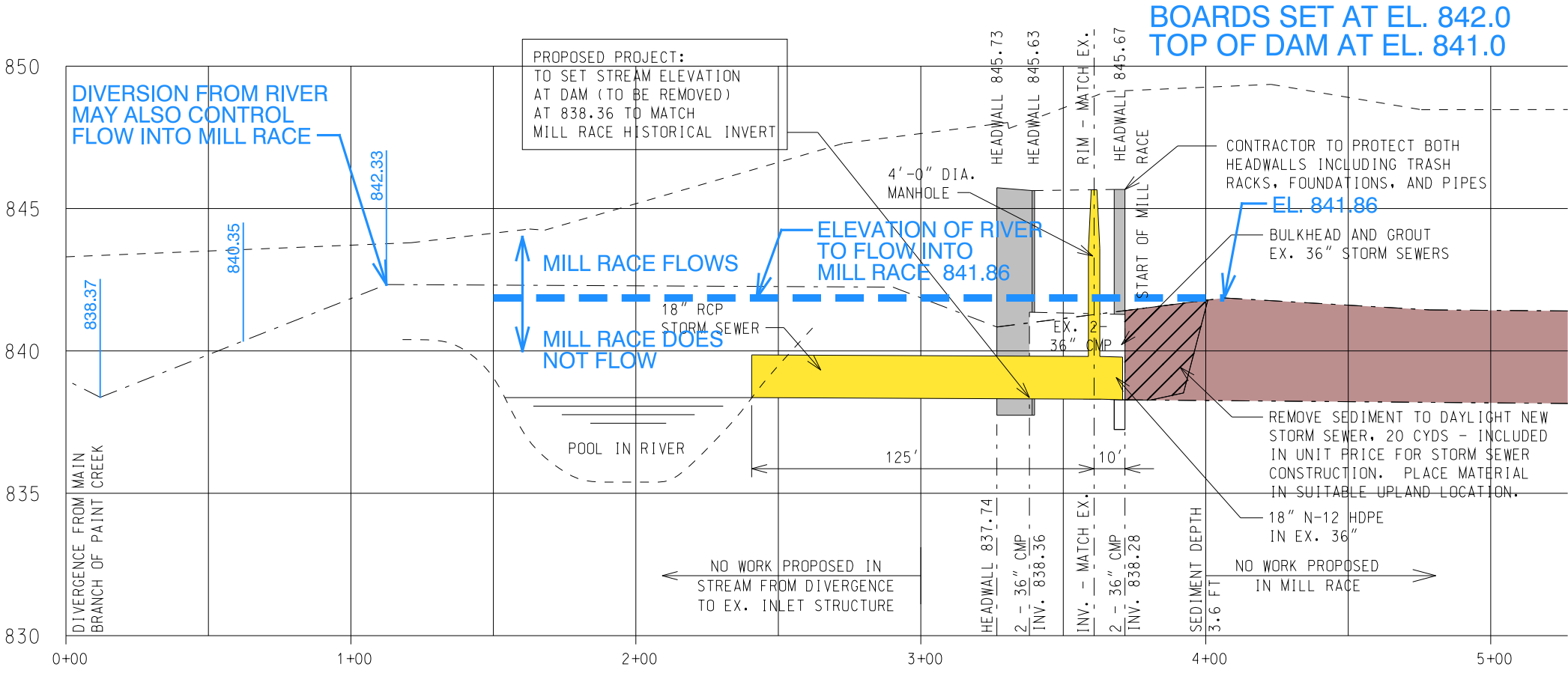
The millrace as it stands today in its silted-up condition is still a visible remnant of the original deeper millrace, although its integrity is somewhat diminished due to the accumulation of silt, which makes it considerably shallower than its original configuration. In effect, the millrace is suffering from gradual "demolition by neglect" (i.e. it has been allowed to silt up through inaction). However at this time, it still conveys its historic character, in that that the channel still is clearly visible. Thus, today it appears to still retain enough integrity to be eligible for the National Register of Historic Places.

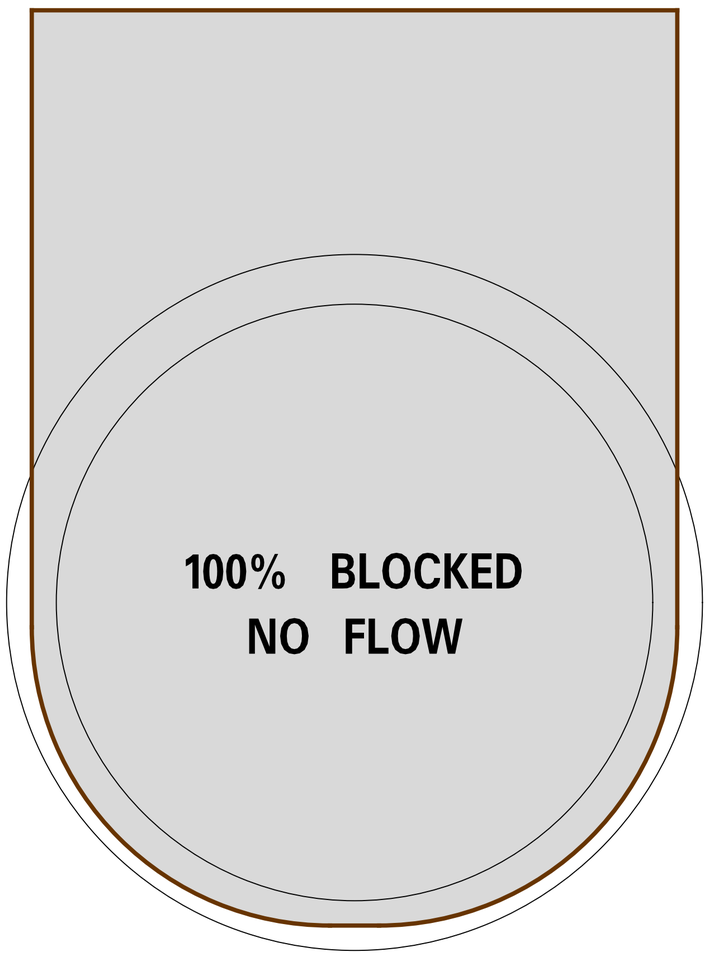
With lack of dredging, increases in the height of the dam, and continued silt deposition, the channel will eventually fill in and lose the visible features that defined its physical character during its period of significance, thus losing enough integrity that it would no longer be eligible for the National Register of Historic Places.

Please feel free to contact me if you have any questions.

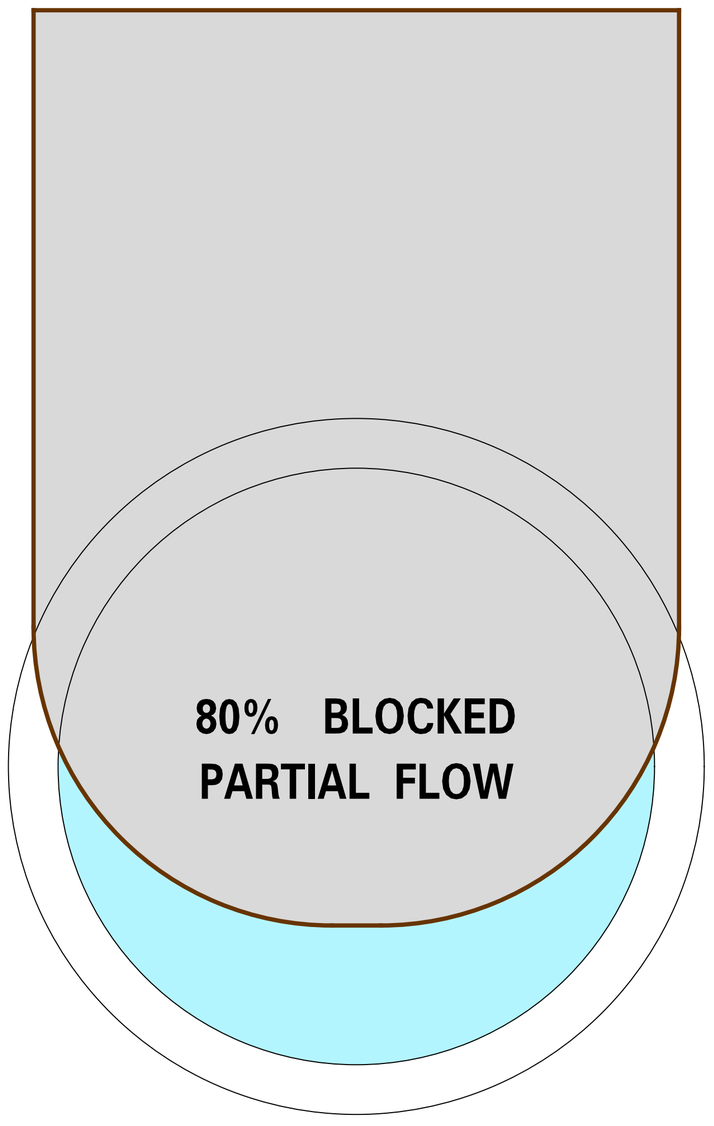
Sincerely,

Gene Hopkins, FAIA
Principal
HopkinsBurns Design Studio


BOARDS SET AT EL. 842.0
TOP OF DAM AT EL. 841.0
DIVERSION FROM RIVER
MAY ALSO CONTROL
FLOW INTO MILL RACE
842.33
840.35
838.37
PROPOSED PROJECT:
TO SET STREAM ELEVATION
AT DAM (TO BE REMOVED)
AT 838.36 TO MATCH
MILL RACE HISTORICAL INVERT
MILL RACE FLOWS
MILL RACE DOES
NOT FLOW
ELEVATION OF RIVER
TO FLOW INTO
MILL RACE 841.86
18" RCP
STORM SEWER
4'-0" DIA.
MANHOLE
HEADWALL 845.73
HEADWALL 845.63
RIM - MATCH EX.
HEADWALL 845.67
START OF MILL RACE
EX. 2 -
36" CMP
CONTRACTOR TO PROTECT BOTH
HEADWALLS INCLUDING TRASH
RACKS, FOUNDATIONS, AND PIPES
EL. 841.86
BULKHEAD AND GROUT
EX. 36" STORM SEWERS
REMOVE SEDIMENT TO DAYLIGHT NEW
STORM SEWER, 20 CYDS - INCLUDED
IN UNIT PRICE FOR STORM SEWER
CONSTRUCTION. PLACE MATERIAL
IN SUITABLE UPLAND LOCATION.
18" N-12 HDPE
IN EX. 36"
POOL IN RIVER
125'
10'
NO WORK PROPOSED IN
STREAM FROM DIVERGENCE
TO EX. INLET STRUCTURE
NO WORK PROPOSED
IN MILL RACE
DIVERGENCE FROM MAIN
BRANCH OF PAINT CREEK
HEADWALL 837.74
2 - 36" CMP
INV. 838.36
INV. - MATCH EX.
2 - 36" CMP
INV. 838.28
SEDIMENT DEPTH
3.6 FT
850
845
840
835
830
0+00
1+00
2+00
3+00
4+00
5+00



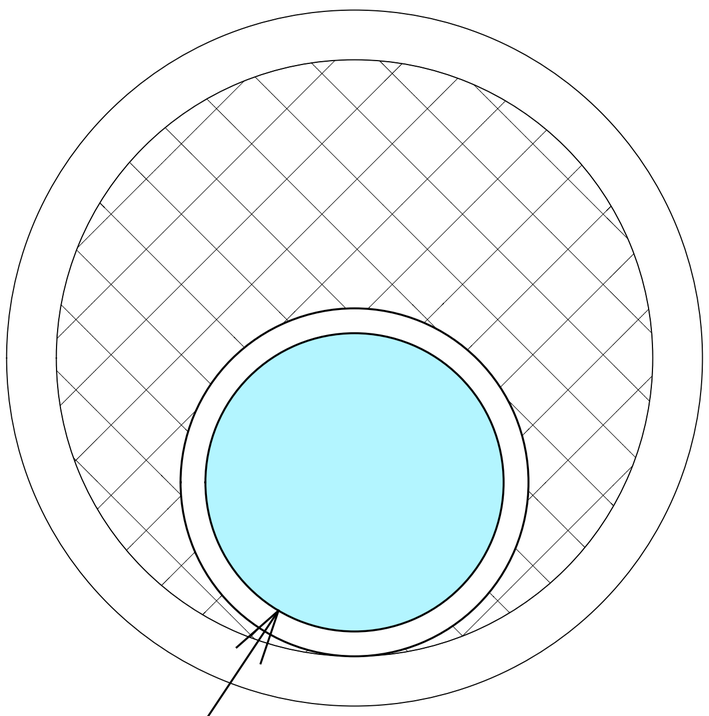
EXISITNG TWIN
36" CMP's



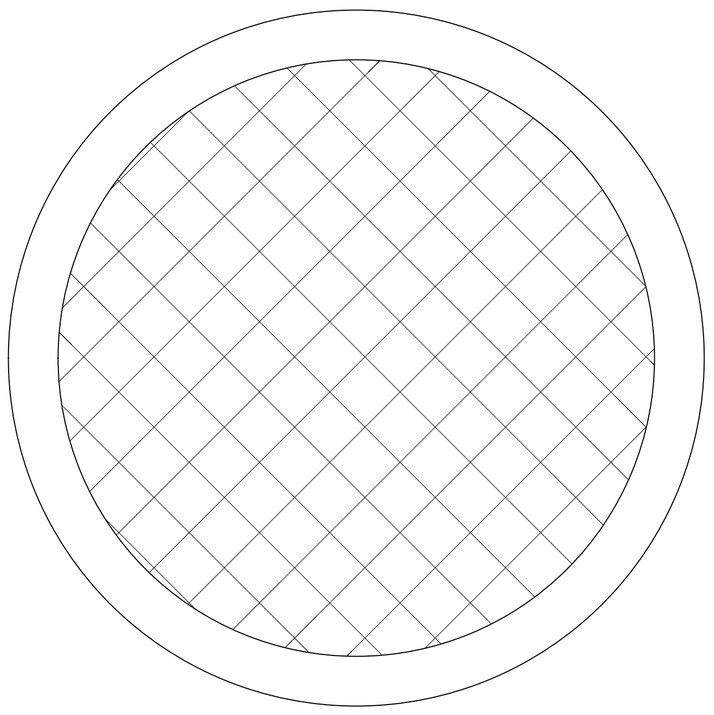
INLET CONDITIONS

LOOKING DOWNSTREAM

ALLOWS 10% OF RIVER FLOW INTO MILL RACE



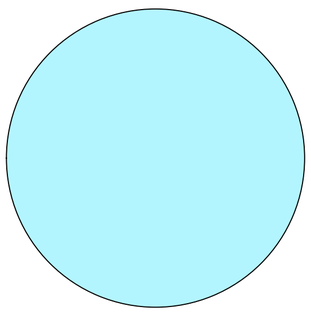
EXISITNG TWIN
36" CMP's



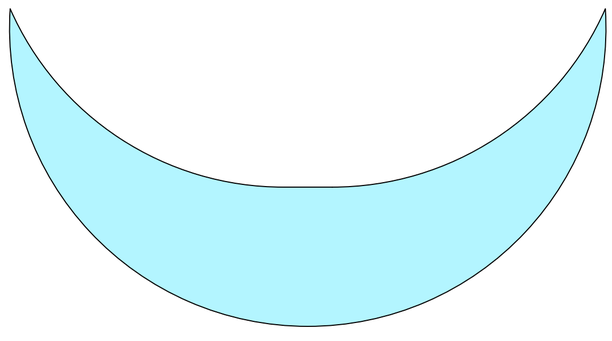
OUTLET CONDITIONS

LOOKING UPSTREAM

ALLOWS 10% OF RIVER FLOW INTO MILL RACE



AREA = 253.44 square inches



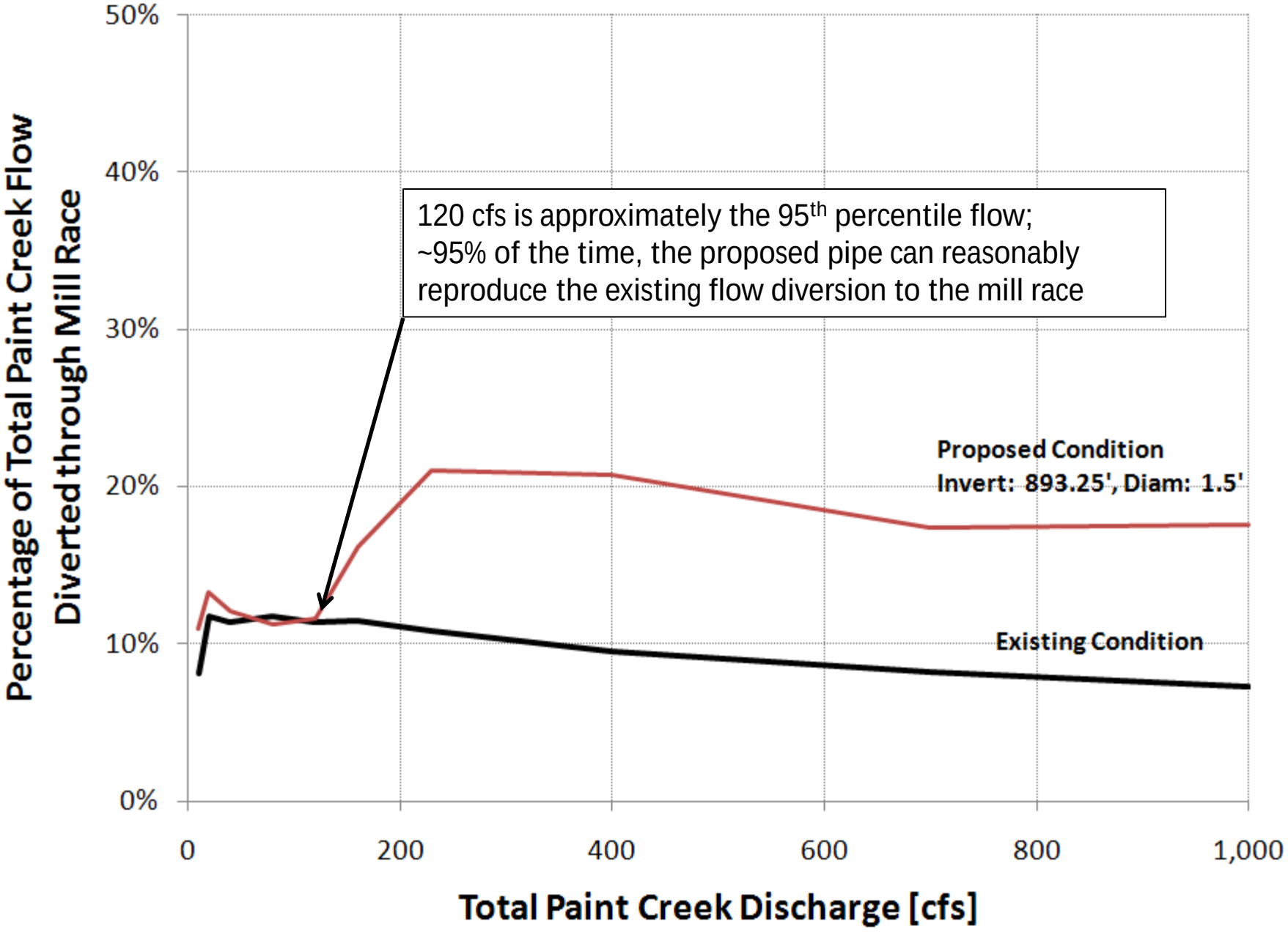
AREA = 263.52 square inches

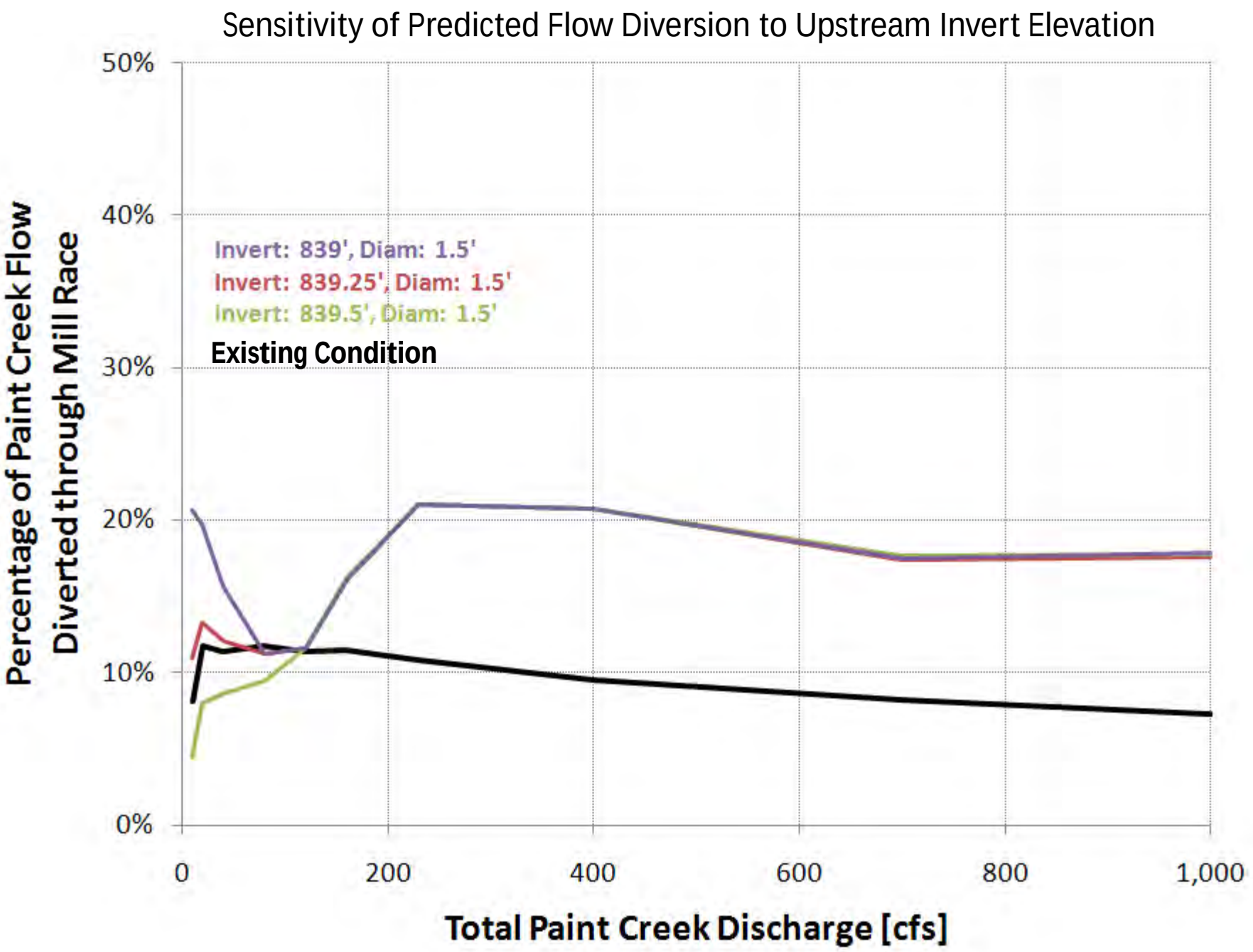
Paint Creek Modeling Analysis

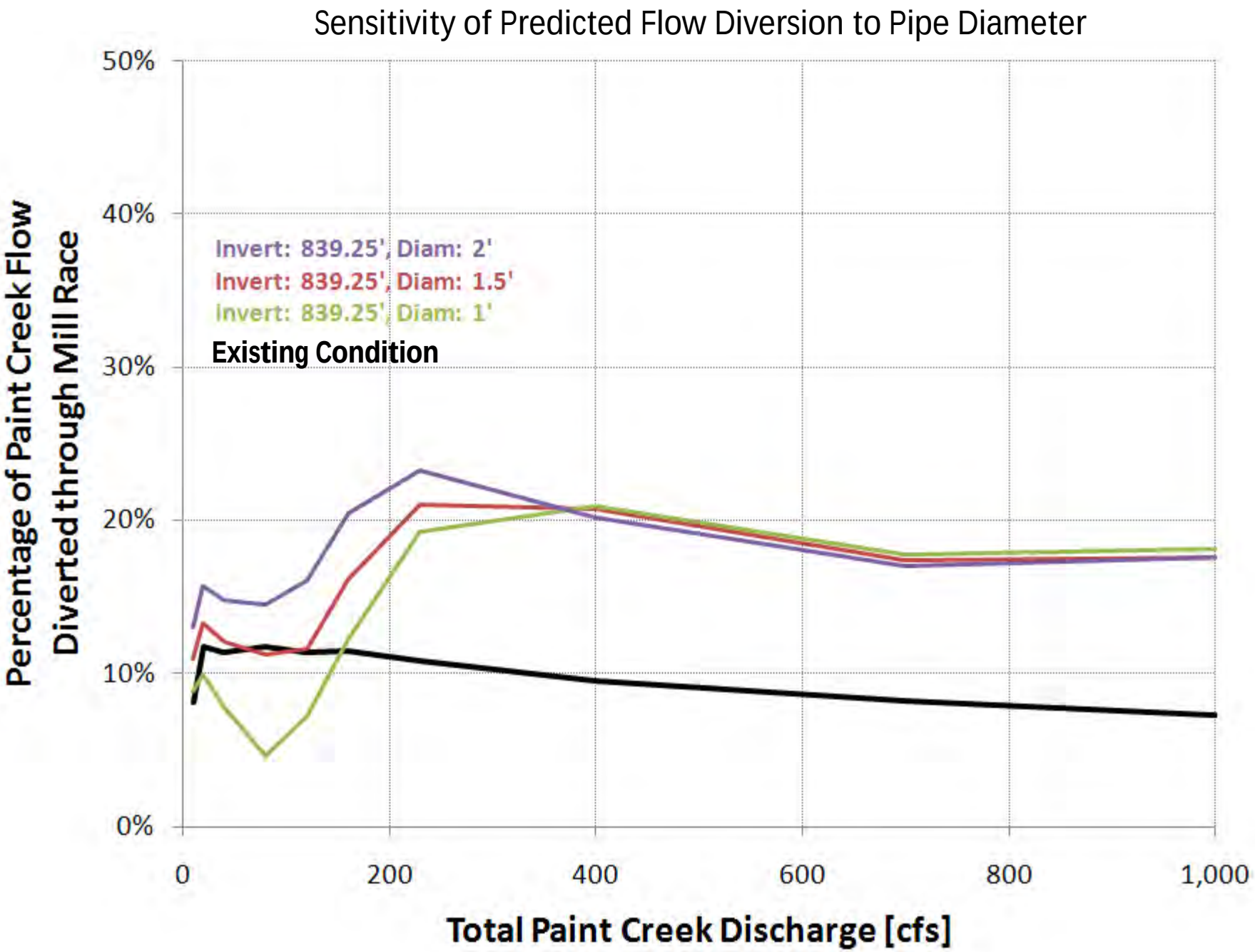
7/7/2011

Overview

- Modeled proposed pipe designed to maintain existing mill race flows
  - Assumed headwall and culverts removed from mill race
  - Assumed downstream portion of mill race dredged to original bed elevation
- Tested various pipe diameters and invert elevations
- Compared predicted flow split to existing flow split over wide range of flow conditions


Percentage of Total Paint Creek Flow Diverted through Mill Race
50%
40%
30%
20%
10%
0%
0
200
400
600
800
1,000
Total Paint Creek Discharge [cfs]
120 cfs is approximately the 95th percentile flow; ~95% of the time, the proposed pipe can reasonably reproduce the existing flow diversion to the mill race
Proposed Condition
Invert: 893.25', Diam: 1.5'
Existing Condition


Sensitivity of Predicted Flow Diversion to Upstream Invert Elevation
50%
40%
30%
20%
10%
0%
Percentage of Paint Creek Flow Diverted through Mill Race
Invert: 839', Diam: 1.5'
Invert: 839.25', Diam: 1.5'
Invert: 839.5', Diam: 1.5'
Existing Condition
0
200
400
600
800
1,000
Total Paint Creek Discharge [cfs]


Sensitivity of Predicted Flow Diversion to Pipe Diameter
50%
40%
30%
20%
10%
0%
Percentage of Paint Creek Flow Diverted through Mill Race
Invert: 839.25', Diam: 2'
Invert: 839.25', Diam: 1.5'
Invert: 839.25', Diam: 1'
Existing Condition
0
200
400
600
800
1,000
Total Paint Creek Discharge [cfs]

Summary

- Proposed pipe diameter: 18 inches
- Proposed invert elevation: 839.25’
- ~95% of time, flow split to mill race is maintained at current magnitudes
- At flows greater than 120 cfs, flow diversion to mill race increases up to ~20%

Paint Creek Modeling Status

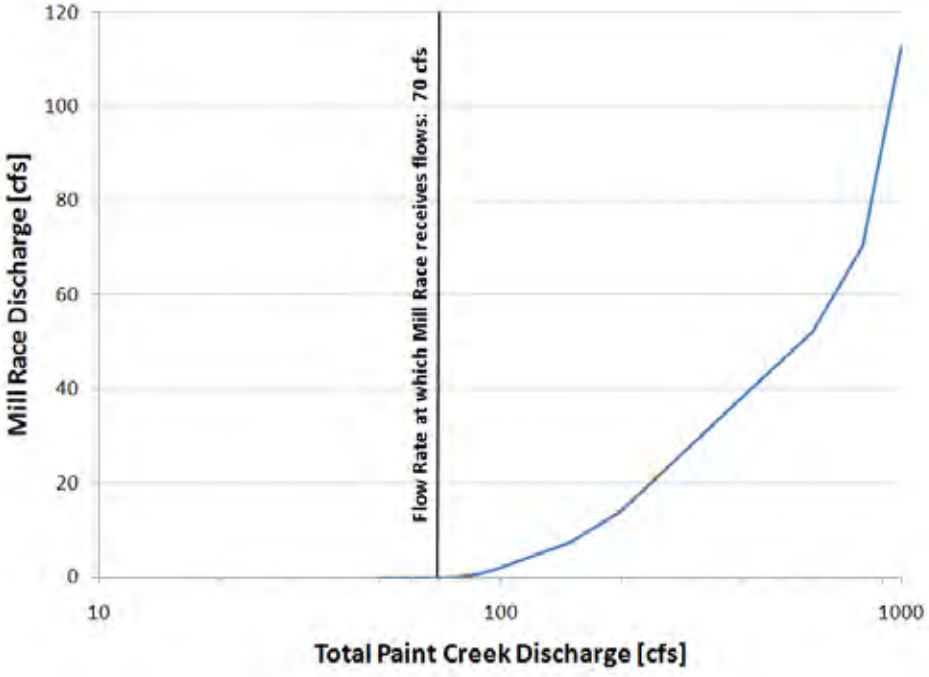
6/29/2011

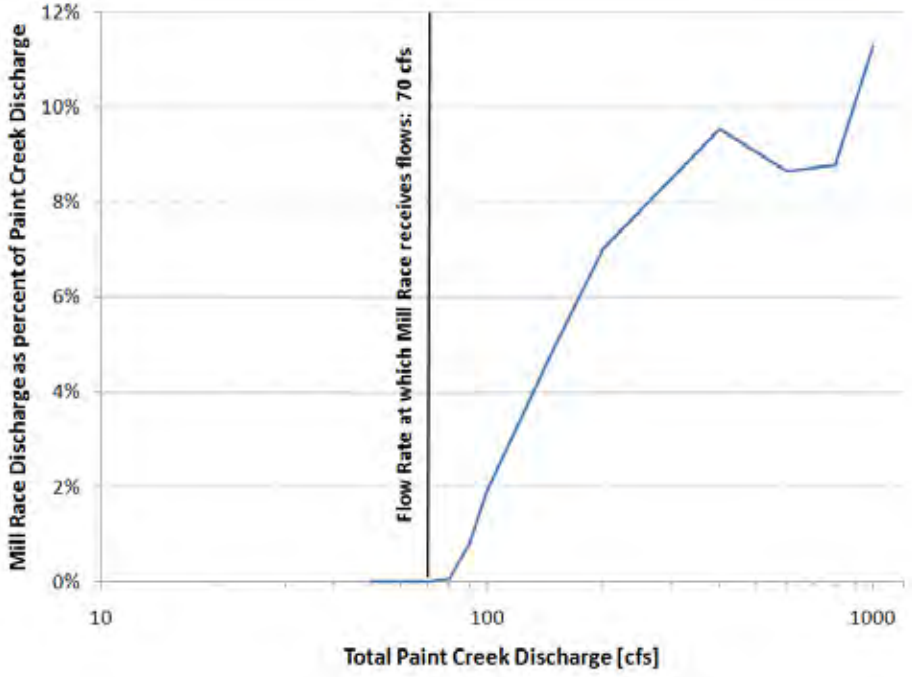
Overview

- Impact of lowering Paint Creek dam to 838.4’
  - No flow to mill race for flows less than ~70 cfs (85^{th} percentile flow)
  - Significantly elevated shear stress in vicinity of dam
  - Elevated shear stresses persist to upstream limit of model domain
  - Highest calculated shear stress are capable of moving most of the measured particle size distribution

Impact of Lower Dam on Flow Split

Calculated flow split over a range of flows





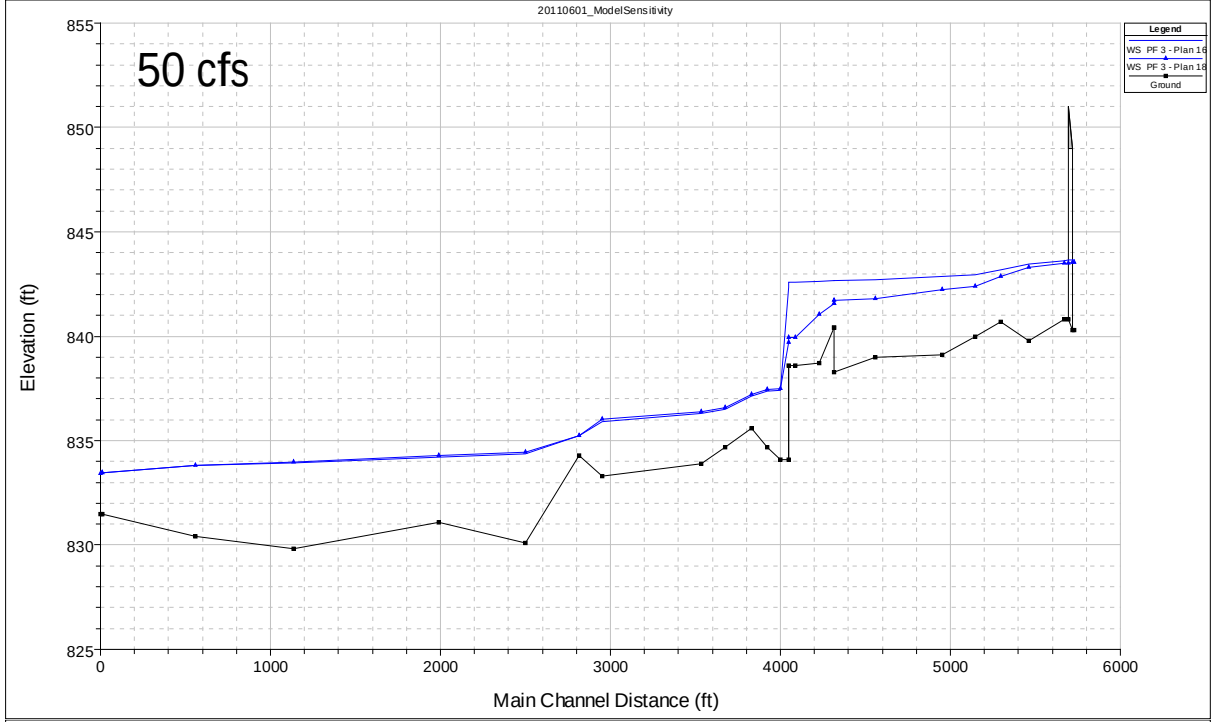
If the dam is lowered to 838.4', the mill race will not receive flow about 85% of the time (i.e. 70 cfs is the 85th percentile flow)

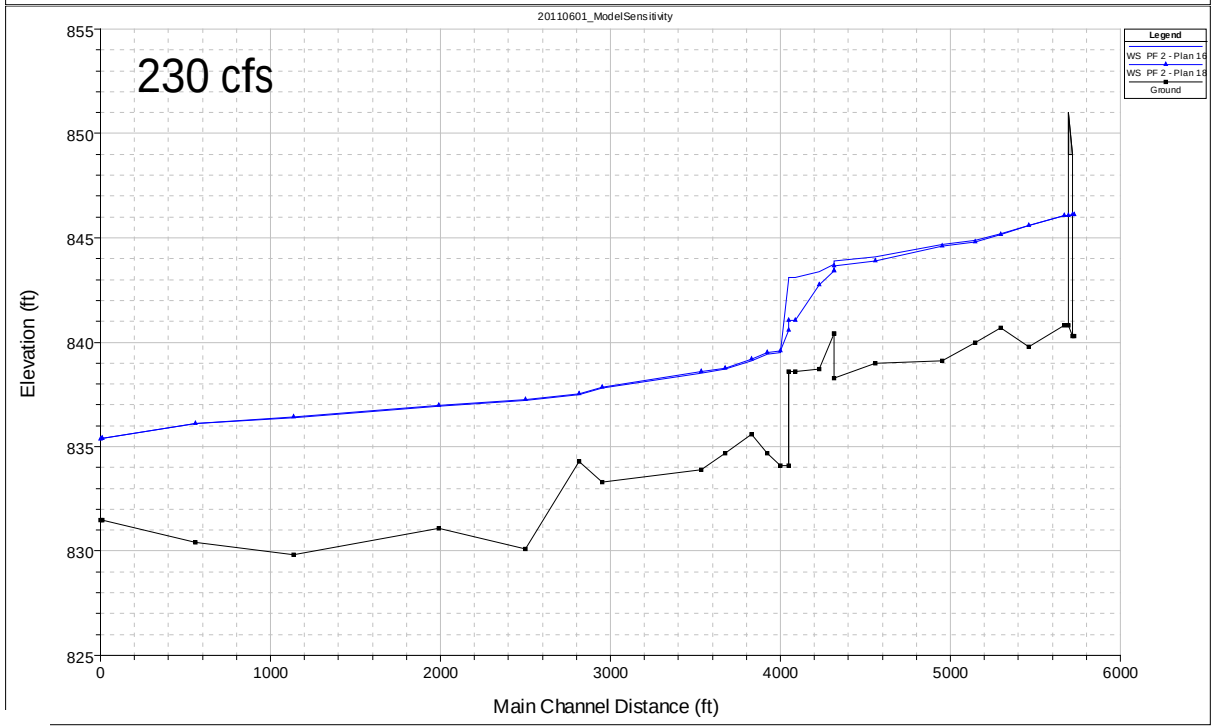
Calculated
Water Surface Profiles

On each plot, two water surface profiles are shown:

current conditions (dam at 841.8’)

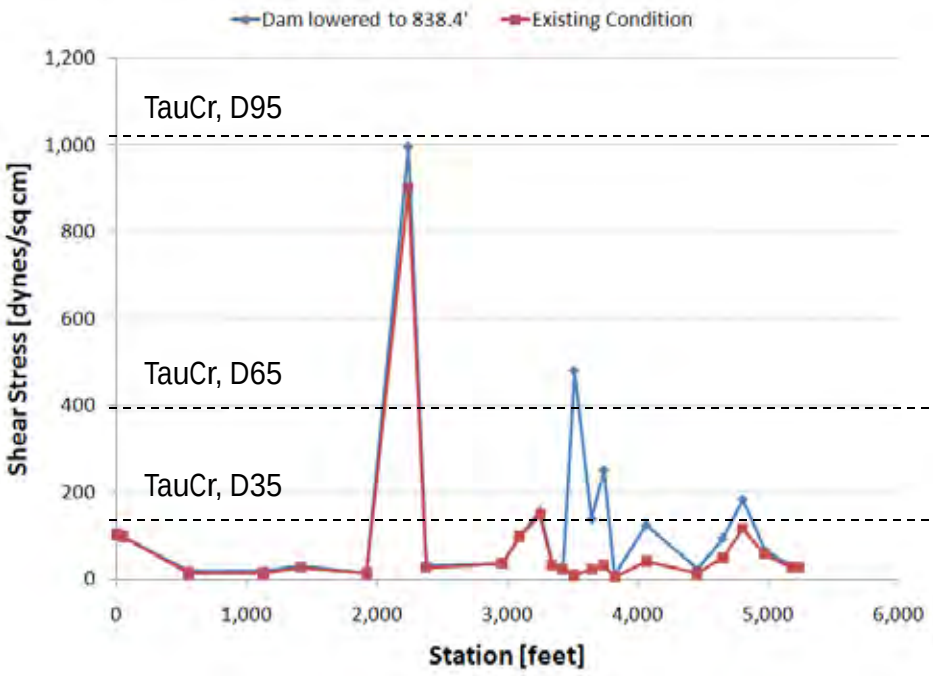
proposed conditions (dam at 838.4’)



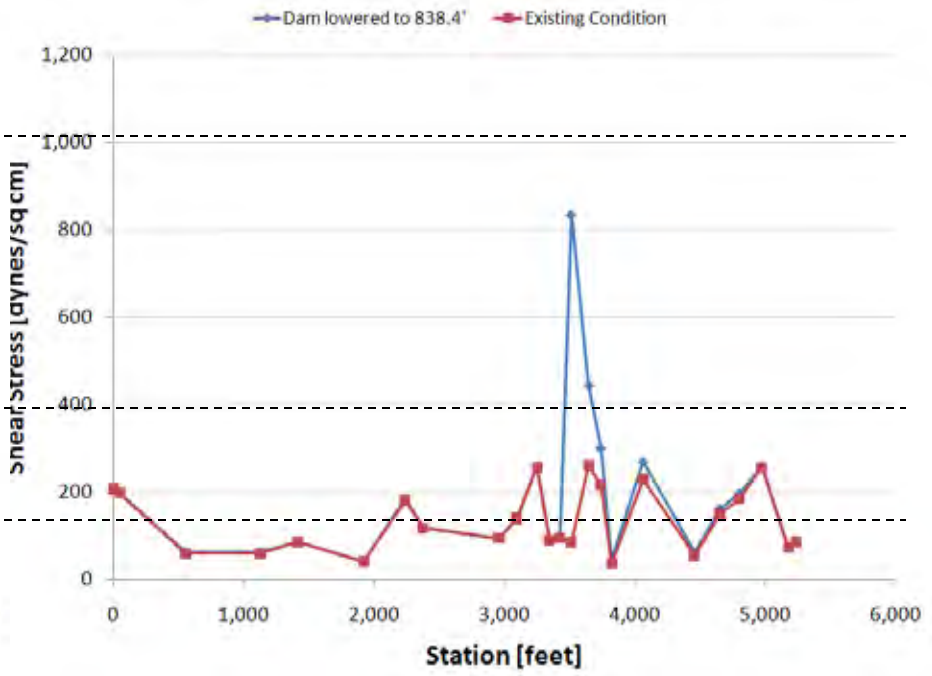


Calculated
Shear Stress Profiles

50 cfs



230 cfs



Dam occurs near station 3,500

Note: "TauCr, D95" represents the critical shear stress for incipient motion of the 95th percentile particle diameter from a sieve analysis of Paint Creek sediments

Final Thoughts

- Model compares well to the limited available data
- Additional high flow measurements necessary to validate model
- Lowering the dam to 838.4’ will prohibit flows into the mill race approximately 85% of the time
- Significant potential for degradation of channel upstream of dam with some potential for influence at Gunn Road

GOODRICH et al. v. McMILLAN et al. (EAST et al., Interveners). (No. 34.)

(Supreme Court of Michigan. March 30, 1922.)

Waters and water courses ⟸167(1)—Persons building cottages, etc., with reference to artificial level held to have no reciprocal right to have dam maintained.

One acquiring a prescriptive right to overflow lands by means of a dam was under no obligation to maintain the dam, and persons holding under independent titles, and building cottages and other improvements with reference to the artificial level of the water, acquired no reciprocal right or easement to have the dam maintained, and such lands overflowed as against the owner of the dam and the owners of the overflowed lands.

Appeal from Circuit Court, Cass County, in Chancery; White, Judge.

Action by Clyde Goodrich and others against William H. McMillan and others. East and others intervened. Decree in favor of defendants and interveners, and plaintiffs appeal. Affirmed.

Argued before FELLOWS, C. J., and WIEST, STONE, CLARK, BIRD, SHARPE, MOORE, and STEERE, JJ.

Walter C. Jones, of Marcellus, and Graham & Crane, of South Bend, for appellants.

Thomas J. Cavanaugh, of Paw Paw, for appellees.

CLARK, J. The grantor of defendant McMillan in the regular chain of title built a mill dam of earth and timber about the year 1850 in Dowagiac river. It raised the level of several small lakes nearly three feet. It flowed lands to the extent of 1,600 acres. The flowage rights were acquired by prescription, and have been conveyed with the mill property.

The forests disappeared. The sawmill followed. The gristmill was almost abandoned when in 1917 the dam, aged and decayed, went out after having maintained the waters of the lakes above natural level for nearly 70 years. Defendant McMillan decided not to rebuild the dam, and made a tentative if not an executed agreement with certain owners of the flowed lands to surrender the flowage rights.

The plaintiffs as a class are cottage owners. In 1886 they and their grantors began building summer cottages, hotels, and other improvements on at least one of the lakes and such buildings and improvements were with reference to the artificial level of the lakes. The return to natural level has damaged them seriously, they say. They built a dam in the river above the site of McMillan's dam, and restored the artificial water level. McMillan destroyed this dam. They rebuilt it, and filed this bill to enjoin further interference. The bill was later amended to seek decree that McMillan be required to rebuild, repair, and maintain his dam at the mill site in such manner as to restore the artificial level of the lakes, and that, in the event of McMillan's failure or refusal to do so, plaintiffs be permitted to enter upon the premises and so rebuild, repair and maintain.

Defendant McMillan answered. The other defendants, being as a class owners of the flowed lands, were permitted to intervene and answer. Defendants prayed affirmative relief, that plaintiffs be required to remove and keep their dam from the river.

The title of plaintiffs and their grantors and the title of defendant McMillan and his grantors have been always independent. None of the plaintiffs acquired title from McMillan or his grantor.

The bill was dismissed. Defendants were decreed the relief they prayed. Plaintiffs have appealed.

Plaintiffs contend that they have acquired the reciprocal right to have the waters maintained at the artificial level; that such level, in legal effect, has become the natural level. They cite Kray v. Muggli, 84 Minn. 90, 86 N. W. 882, 54 L. R. A. 473, 87 Am. St. Rep. 322. This decision overruled 77 Minn. 231, 79 N. W. 964, 1026, 1064, 45 L. R. A. 218. It supports plaintiffs' contention. But it is said in 27 R. C. L. 1206, that "this decision has been severely criticised," and, in Farnham on Waters and Water Rights, 2406:

"There seems to be no principle on which Kray v. Muggli can be supported."

And it is indicated in Lake Drummond Canal, etc., Co. v. Burnham, 147 N. C. 41, 60 S. E. 650, 17 L. R. A. (N. S.) 945, 125 Am. St. Rep. 527, that—

"The Minnesota decision and some others of like tendency, are not in accord with the weight of authority."

See 17 L. R. A. (N. S.) 945.

Counsel also cite Smith v. Youmans, 96 Wis. 163, 70 N. W. 1115, 37 L. R. A. 285, 65 Am. St. Rep. 30. This case resembles Hass v. McManus, 161 Mich. 372, 126 N. W. 462, and is not in point.

Belknap v. Trimble, 3 Paige (N. Y.) 577, is also cited, but it and some other cases cited are reviewed and distinguished in Farnham on Waters and Water Rights, pp. 2398 to 2407. Nor is Mathewson v. Hoffman, 77 Mich. 420, 43 N. W. 879, 6 L. R. A. 349, in point.

Following are correct statements of the law:

It is said in Farnham on Waters and Water Rights, at pages 2402, 2403:

⟸For other cases see same topic and KEY-NUMBER in all Key-Numbered Digests and Indexes

"The fact that the exercise of the easement is of advantage to the owner of the servient estate will give him no right to insist on the exercise of the easement on the part of the dominant owner. An easement exists for the benefit of the dominant estate alone, and the servient owner acquires no right to insist on its continuance, or to ask for damages on its abandonment."

And at page 2406:

"If he (the owner of the servient estate) suffers injury it is purely from his own negligence. There is not an instant during the time that the prescriptive period is running when he could not compel the owner of the dam to remove it or to enter into a contract giving the owner of the submerged land a right to maintain it, which contract might be executed and recorded in such a way as to leave no doubt as to his right to maintain the dam for his own benefit. The law favors diligence and a disposition to protect one's own rights and is not disposed to permit one to acquire rights against another by passive acquiescence in his transaction."

And the following from a note in 50 L. R. A. 841:

"In the absence of peculiar circumstances sufficient to constitute an estoppel upon the owner of the prescriptive right, or to give the adverse party himself an adverse right, the better opinion is that the mere acquisition of a prescriptive right to an artificial condition of water will impose no obligation to maintain such condition. The reason for this is that adverse use is necessary to establish prescriptive rights."

It was said in Taft v. Bridgeton Worsted Co., 237 Mass. 385, 130 N. E. 48, 13 A. L. R. 928:

"Of course the plaintiffs [owners of the flowed lands] had no right to compel the defendant to maintain its dam for their benefit. The defendant had a right at any time to take down its dam or to cease to impound water for any reason which seemed to it sufficient. With such conduct the plaintiffs have no legal concern. Lakeside Mfg. Co. v. Worcester, 186 Mass. 552, 72 N. E. 81; Flagg v. Concord, 222 Mass. 569, 578, 111 N. E. 369; Mason v. Whitney, 198 Mass. 152, 78 N. E. 881, 7 L. R. A. (N. S.) 289, 118 Am. St. Rep. 488."

McMillan's grantor acquired the right of flowage and to maintain the dam by prescription. It was he and his grantee, not plaintiffs, who used the flowed lands adversely. The plaintiffs therefore have acquired no prescriptive rights to flow the lands or to maintain the dam. And in principle the claim of a reciprocal right or a reciprocal easement may not be founded upon the prescriptive right of one only of the parties of interest. The defendant might take out his dam, or after it went out he might refuse to rebuild, with which plaintiffs have no legal concern.

No circumstance to constitute an estoppel upon the owner of the prescriptive rights is shown. Plaintiffs for good reason seem to have abandoned all claims for the dam which they built. We find nothing either in law or in fact by which plaintiff's claim to relief may be sustained.

The decree is affirmed.

The late Justice STONE took no part in this decision.

LADA v. LASZLO et al. (No. 186.)*

(Supreme Court of Michigan. March 30, 1922.)

1. Justices of the peace ⇐72—Have no jurisdiction of summary proceedings, where lands are outside the township.

A justice of the peace has no jurisdiction to receive a complaint in summary proceedings and issue the summons, where the lands were not located in the township in which he was a justice.

2. Justices of the peace ⇐52—Cannot assume powers of disqualified court commissioner in summary proceedings concerning lands outside of township.

In view of Const. art. 7, §§ 15, 16, relating to justices of the peace, and Comp. Laws 1915, § 12182, providing that, where a circuit court commissioner who has issued process in summary proceedings is disqualified, any officer having authority to perform the like duty in the same county can assume jurisdiction, a justice, whose jurisdiction in summary proceedings is limited, under sections 13229, 13231, 13241, to cases involving lands within his township, cannot assume jurisdiction, if the lands are located outside the justice's township.

Error to Circuit Court, Monroe County; Jesse H. Root, Judge.

Summary proceedings by Charles Lada against John Laszlo and another. Judgment for the plaintiff on appeal from a justice of the peace, and defendants bring error. Reversed, and complaint dismissed.

Argued before FELLOWS, C. J., and WIEST, STONE, CLARK, BIRD, SHARPE, MOORE, and STEERE, JJ.

Elmer J. Alway, of Milan (J. C. Lehr, of Monroe, of counsel), for appellants.

Geo. S. Wright, of Monroe, for appellee.

SHARPE, J. May a justice of the peace hear and determine a summary proceeding begun by a circuit court commissioner under

*The amendment of section 13231, 3 Comp. Laws 1915, by Act No. 172, Pub. Acts 1919, extending the jurisdiction of the justice to lands in "any adjoining or contiguous city or township," was not called to the attention of the court; but it in no way affects the conclusion reached, as the lands in question did not lie in an "adjoining or contiguous city or township" to that in which the justice resided.—Reporter.

The Court of Appeals found that common law remedies are not precluded by ILSA and that approval from MDNR did not, **ipso facto**, make defendant's actions reasonable under the circumstances. Defendant, however, had merely returned the lake to its natural level. The Michigan Supreme Court in **Goodrich v McMillan**, 217 Mich 630; 187 NW 368 (1922), held that a dam owner has no duty to maintain water at an artificial level created by the dam and that, to maintain an action, those injured by the water's return to its natural level must show that they had acquired a prescriptive right to maintenance of the artificial level. In affirming, the Court found that plaintiff, Stidham, was unable to make such a showing.

ii. **Cook v Grand River Hydroelectric Power, Inc**, 131 Mich App 821; 346 NW2d 881 (1984). Plaintiff property owners had purchased property abutting the Thornapple River in Kent County upstream from the La Barge Dam between 1971 and 1980. The dam and all rights appurtenant thereto were purchased by defendant in 1980 from Consumers Power Company. Consumers had ceased using the dam to generate electricity in 1965, and in 1970 ceased using the dam gates, leaving them open. Defendant, after purchasing the dam, prepared to re-establish the dam as a hydroelectric power-producing facility and, in July, 1982, closed the dam gates. Consequently, the water level was raised approximately two to three inches above the dam's spillway and caused flooding of plaintiffs' properties. Plaintiffs' brought suit seeking injunctive and monetary relief. The trial judge dismissed plaintiffs' claims, finding that defendant had valid flowage easements over plaintiff's properties and no **prima facie** MEPA violation was established on the record.

The Court of Appeals affirmed, holding that, even if the Marketable Record Title Act, 1945 PA 200, as amended; MCLA 565.101 **et seq**; MSA 26.1271 **et seq**, extinguished express flowage easements which had originally been acquired by Consumers and conveyed to defendant, defendant had acquired prescriptive flowage easements over plaintiffs' properties. These prescriptive rights arose out of Consumers' operation of the dam and resultant flooding of the properties from 1927 to 1970, a period in excess of the requisite 15 years of open, notorious and continued use. The Marketable Record Title Act does not extinguish interests created by adverse possession Abandonment of prescriptive easements, which requires 15 years of continuous nonuse, could not be proved as Consumers had operated the dam gates until 1970. The Court also rejected plaintiffs' estoppel argument, finding that Consumers had no duty to advise plaintiffs of the prescriptive easements at the time plaintiffs purchased their properties or to update county records to reflect them. Finally, the Court affirmed the dismissal of plaintiffs' MEPA claim by the trial judge based on a finding that operation of the dam was not likely to pollute, impair, or destroy the environment.

4. **Wetland Protection: United States v Riverside Bayview Homes, Inc**, 729 F2d 391 (6th Cir, 1984), **cert granted**, _____ US _____; 105 S Ct 1166; 84 L Ed 2d 318 (1985). Riverside Bayview Homes, Inc., owned approximately 80 acres of undeveloped land in Harrison Township, Michigan. The government claimed that Riverside and Allied Aggregate Transportation Company violated Section 301(a) of the federal Clean Water Act, 33 USC 1311(a) ("CWA"), and the regulations dealing with "wetlands," because defendants had failed to obtain a permit from the United States Army Corps of Engineers ("COE") prior to depositing fill material on the land, which the government contended was a "wetland." The trial court issued a permanent injunction prohibiting further filling on a large portion of the property. The Sixth Circuit remanded the case to the trial court in light of new regulations, 33 CFR 323.2(c), that had altered the definition of "wetland." On remand, the trial court held that Riverside's property was a "wetland" and subject to COE's regulation under the CWA. On appeal from the remand, the Sixth Circuit concluded that the trial court had erred, and held that COE's new definition of wetlands did not include the property and vacated the injunction.

Judge Kennedy, in the original trial court decision, had found that Riverside's property satisfied 33 CFR 209.120(d)(2)(i)(h) which defined "freshwater wetlands" as areas that are "periodically inundated" and that "are normally characterized by the prevalance of vegetation that requires saturated soil conditions for growth and reproduction." Judge Kennedy indicated that, while there were high-water levels surrounding the property in 1973-1975, those levels were unprecedented and that only approximately 17% of the time was the property inundated. She concluded, however, that the property was inundated on four to six occasions in the past 80 years and, thus, satisfied COE's wetland definition. The definition was thereafter amended and the "periodic inundation" language was eliminated by COE. The preamble to the regulation change states that the decision as to whether certain property constitutes a wetland is based on whether the property "as it exists" meets the definition. Based on this, the Sixth Circuit concluded that Riverside's property was not a "wetland." The Court found that, under the new regulation, present occurrence of inundation or flooding sufficient to support wetlands vegetation is necessary before any land is considered a "wetland." Without evidence that the property is **as it now exists** frequently flooded, causing aquatic vegetation to grow there, the government cannot succeed in classifying the property as a wetland subject to COE regulation. The Court recognized the necessity of narrowly interpreting the wetlands regulations to avoid a taking problem under the Fifth Amendment to the United States Constitution. The Court's conclusion leaves Riverside free to develop its land. The United States Supreme Court recently agreed to hear the government's appeal.

5. **Zoning, Easements And Municipal Annexation:**

a. **Oakland Court v York Twp**, 128 Mich App 199; 339 NW2d 873 (1983). Plaintiff submitted a subdivision plat to York Township for approval. Part of the affected land was zoned for agricultural use and part for residential use. Plaintiff sought to have the land zoned for agricultural use rezoned for residential use. York Township denied the rezoning request and subsequently denied approval of a subdivision plat for the property, relying on an ordinance which prohibited approval of plats where any part of the affected land was in an agricultural district. The trial court dismissed an action by plaintiff seeking mandamus to compel approval of the proposed plat. The Court of Appeals affirmed, holding that a party is not entitled to mandamus to compel approval of a plat unless the zoning district permits the proposed use. Although the Subdivision Control Act does not list as a condition for approval a requirement that the land fit within the applicable zoning classification, the Court determined that proper zoning is an implied precondition to the platting process. **But see, Arrowhead Dev Co v Livingston County Rd Comm'n**, 413 Mich 505; 322 NW2d 702 (1982), discussed **infra** at p 153.

b. **Warber v Moore**, 126 Mich App 770; 337 NW2d 918 (1983). Defendant obtained a permit from the Ottawa County Road Commission to construct a gravel driveway along Bayou Lane, the sole means of access to defendant's lakefront home. Plaintiffs, neighboring property owners, owned a one-seventh interest in an easement used to gain access to one of their lots. At the intersection of Bayou Lane and the easement, there was a gully or ravine which rendered Bayou Lane impassable. Defendant filled in the ravine at the intersection, thereby increasing the grade along the easement. Plaintiffs brought suit, seeking to have the improvement removed as it prevented access to their lot. The trial court held that defendant had unlawfully changed the grade of a public road and subsequently ordered defendant to restore Bayou Lane to its original grade. Defendant appealed the trial court's refusal to grant a writ of mandamus compelling the Road Commission to establish a grade for Bayou Lane.

The Court of Appeals applied the principle that mandamus may issue to compel public authorities to exercise discretion reposed in them by law where the public authority has asserted its jurisdiction over a matter and has refused to exercise its discretion over a crucial aspect of the matter. The Court held that the trial court had erred in refusing to issue a writ of mandamus requiring the Commission to establish a grade for Bayou Lane.

c. **Shelby Twp v State Boundary Comm'n**, 129 Mich App 650; 341 NW2d 855 (1983). The City of Utica attempted to annex approximately one-half square mile of land located in Shelby Township. The Michigan State Boundary Commission granted Utica's request finding that Shelby Township was not exempt from annexation pursuant to Section 34, MCLA 42.34; MSA 5.46(34), because "it serves only about 6% of the township land area and less than 1/3 of the townships [sic] total population with sewer." 129 Mich App at 653. The trial court reversed the commission's decision and held that the commission erred in interpreting Section 34 to permit annexation.

The Court of Appeals affirmed the decision of the trial court, holding Shelby Township exempt from annexation pursuant to Section 34(l)(f), MCLA 42.34(l)(f); MSA 5.46(34)(l)(f), based on the fact that Shelby Township provides one-third of its residents with sewer service and has the current capacity to provide virtually all its residents with water services. 129 Mich App at 657. The Court of Appeals rejected the argument that to be exempt the Township must provide both water **and** sewer services. The legislature only provided that a township must provide water **or** sewer services. The Court recognized the principle of deference to an agency's interpretation of statutory language, but concluded that such administrative interpretation cannot overcome the plain meaning of the statute. 129 Mich App at 654. The Court of Appeals decided that Section 34(l)(f) allowed exemption from annexation when a township provides water or sewer service, a condition that was met in this case.

6. **Fishing Rights:**

a. **Attorney Gen v Hermes**, 127 Mich App 777; 339 NW2d 545 (1983), **lv den**, 419 Mich 855 (1984). Defendants were mistakenly granted membership in the Sault Ste. Marie tribe of Chippewa Indians on August 8, 1978. Membership in the tribe allows the exercise of certain fishing rights reserved to the Chippewa Indians by treaty with the United States government. Defendants' tribal membership was withdrawn on December 20, 1978, when the mistake was discovered. Defendants, commercial fishermen, used gill nets on eight occasions between September 20, 1978, and January 26, 1979. The state filed suit seeking damages based upon unjust enrichment and fraud for unlawful taking of fish. Defendants asserted their tribal memberships at the time the fish were taken as a defense. The trial court determined that defendants' tribal memberships were void **ab initio** and could not be asserted as a defense, but found no evidence that defendants had acted in bad faith in their application for tribal membership, and rejected plaintiff's allegations of fraud. However, the trial court found that

STATE OF MICHIGAN

COURT OF APPEALS

JAMES R. HOLTON,

Plaintiff/Counter-Defendant-Appellee,

v

SHARON BONE,

Defendant/Counter-Plaintiff-Appellant.

UNPUBLISHED
December 27, 2007

No. 272113
Oakland Circuit Court
LC No. 2003-050009-CH

Before: Murphy, P.J., and Smolenski and Schuette, JJ.

PER CURIAM.

In this real property dispute, defendant appeals as of right from the trial court's order requiring defendant to remove a culvert from an earthen dam on her property.[1] On appeal, defendant challenges the trial court's authority to grant plaintiff equitable relief based on the theory that plaintiff had a prescriptive right to have the water level on his property artificially maintained by the earthen dam on defendant's property. Because we conclude that the trial court properly exercised its equitable power to grant plaintiff relief, we affirm.

I. Basic Facts and Procedural History

The facts of this case are largely not in dispute. Plaintiff owns land directly south of defendant's parcel. Plaintiff's parcel encompasses the south end of a significant area of wetlands that spans the full width of defendant's parcel and continues to the parcel immediately north of defendant's land. Plaintiff's parcel also contains a pond. The entire wetland area drains from west to the east through defendant's parcel. An earthen dam on defendant's property controls the level of the water in the wetlands area.

[1] Defendant also filed a counter-claim against plaintiff for tortious interference with a contract. However, the trial court found in favor of plaintiff on this claim and defendant has not appealed this part of the trial court's opinion and order.

Defendant's parcel also contains an agricultural field immediately to the east of the wetlands. However, defendant does not have direct road access to the field. In approximately 2003, defendant began to build an access road from the road bordering her property on the west to the field. She decided to build the road through the southernmost end of the wetlands on her property, which area was immediately north of plaintiff's pond. Defendant also had a culvert installed in the earthen dam.

Plaintiff sued defendant for injunctive relief. Plaintiff claimed that defendant's installation of the culvert wrongfully lowered the water level of the entire wetlands area, including the wetlands on his property and his pond. Plaintiff asked the trial court to order the removal of the road and culvert. The case proceeded to a bench trial.

At trial, Junior Clark testified that, at one time, he and his father owned all of the land at issue. Clark stated that the west end of the land was once one contiguous wetland. He further testified that in 1952 he built the earthen dam at issue to create a pond and raise the water level to hard ground to keep his cattle from walking through mud. Clark also said that he had a portion of the wetland, which is now on plaintiff's property, dredged to create a pond. The soil from the dredging was placed immediately north of the dredged area. However, Clark said that the water level is normally fairly high and the strip of land created by the dredged soil is not exposed. Rather, at high water level, the wetlands resemble more of a lake. Clark stated that the pond was created to control runoff and was used to water his cattle. Clark also testified that the earthen dam did not contain a culvert. Clark stated that he sold defendant's parcel to her predecessor in interest in 1968 and sold plaintiff's parcel to plaintiff in 1997. Clark said he continued to visit and use the land sold to plaintiff up until 1997.

At trial, defendant focused her defense on evidence that the dam already contained a culvert, which was not functioning properly, long before she began to build her access road. Defendant claimed that she merely replaced the culvert and restored the dam to proper functioning. Plaintiff argued that defendant deliberately placed the culvert in the dam to reduce the water levels in the wetlands and, thereby, facilitate the construction of her access road.

The trial court determined that defendant's testimony and evidence concerning the culvert were not credible. Instead, the trial court concluded that the earthen dam never had a culvert and that defendant installed the present culvert in order to provide access to the east end of her property at lower cost. Further, the trial court determined that plaintiff "has a right to enjoyment of the water as it existed for the many years prior to his purchase of the property and until such time as Defendant interrupted that enjoyment by installing the culvert." Based on these findings and conclusion, the trial court ordered defendant to remove the culvert.

This appeal followed.

II. Failure to Plead Prescriptive Easement

Defendant first argues that the trial court was without the authority to grant plaintiff injunctive relief based on the theory that plaintiff had a prescriptive right to the maintenance of certain water level on his property. Defendant contends that the trial court lacked this authority because plaintiff never pleaded prescriptive easement and did not amend his complaint to include

a claim of prescriptive easement. Likewise, the parties did not expressly or impliedly consent to the trial of this theory. We disagree.

A trial court does not have the authority to grant relief based on a claim that was never pleaded. See *Peoples Savings Bank v Stoddard*, 359 Mich 297, 325; 102 NW2d 777 (1960) and *City of Bronson v American States Ins Co*, 215 Mich App 612, 619; 546 NW2d 702 (1996). However, under MCR 2.111(B)(1), the "only requirements for stating a cause of action is a presentation of factual allegations that would reasonably inform defendants of the 'nature of the claims' against which defendants are called on to defend." *Smith v Stolberg*, 231 Mich App 256, 260-261; 586 NW2d 103 (1998).

In the present case, plaintiff did not identify any particular theory in his complaint. Instead, plaintiff indicated that his complaint was for injunctive relief and stated the factual bases in support of his request for an injunction. In his factual allegations, plaintiff clearly indicated that he believed that defendant was wrongfully making improvements to her property that lowered the level of water on his land. Specifically, plaintiff alleged that the installation of the culvert in the earthen dam damaged his property and "converted" his pond and wetland. On a fair reading of the complaint, it is apparent that plaintiff was arguing that he had the right to use the dam on defendant's property to maintain the water level on his property. *Smith*, *supra* at 260-261. Thus, plaintiff's complaint placed defendant on notice that plaintiff claimed the right to an easement over defendant's property. See *Mich Dep't Natural Resources v Carmody-Lahti Real Estate, Inc*, 472 Mich 359, 378; 699 NW2d 272 (2005) (noting that an easement is the right to use the land burdened by the easement). Further, it is also clear that plaintiff asked the court to exercise its equitable powers to grant him relief. Indeed, plaintiff requested both the equitable relief of an injunction and "other relief that may be just and proper." "The shape of relief in equity is not of necessity controlled by the prayer, but is formed by the court according to the germane conditions and equities existing at the time decree is made." *Advance Dry Wall Co v Wolfe-Gilchrist, Inc*, 14 Mich App 706, 712; 165 NW2d 906 (1968). Consequently, defendant was on notice that the trial court would sit in equity to determine whether plaintiff had the right to compel defendant to refrain from altering the earthen dam in a way that reduced the level of the water on plaintiff's property.

The trial court did not err in considering whether plaintiff had an easement over defendant's property.

III. Failure of Proofs

Defendant next argues that the trial court erred in granting relief, because plaintiff failed to present evidence that plaintiff's use of the dam was hostile and failed to present evidence that he detrimentally relied on the level of the water. We disagree with both contentions.

The extent of a party's rights under an easement is a question of fact that this Court reviews for clear error. *Blackhawk Dev Corp v Village of Dexter*, 473 Mich 33, 40; 700 NW2d 364 (2005). However, a trial court's dispositional rulings on equitable matters are reviewed de novo. *Id.*

Although defendant claims that the trial court granted relief based on a determination that plaintiff had a prescriptive easement over defendant's property, the trial court did not specifically

justify its determination on that basis. Instead, the trial court merely stated that plaintiff had the right to the "enjoyment of the water as it existed for the many years prior to his purchase of the property and until such time as Defendant interrupted that enjoyment by installing the culvert." However, the trial court's citation of *Mathewson v Hoffman*, 77 Mich 420; 43 NW 879 (1889), suggests that the trial court may have concluded that plaintiff had acquired a prescriptive right to have the level of water maintained by defendant's dam. Because *Mathewson* involved a diversion of a stream rather than the maintenance of water level, it is not directly applicable to the facts of this case. Nevertheless, we conclude on de novo review, that the trial court correctly determined that plaintiff had an equitable right to have the dam maintained in such a way that it did not lower the level of the water on his land.

Generally, the owners of land overflowed by waters as a result of the existence of a dam have no right to require the dam owner to maintain the dam for their benefit. *Goodrich v McMillan*, 217 Mich 630, 634; 187 NW 368 (1922). However, an owner of land overflowed by water can establish a right to the continued flooding of lands. See *Stidham v Algonquin Lake Community Ass'n*, 133 Mich App 94, 99; 348 NW2d 46 (1984) (noting that a land owner may acquire a prescriptive right to the maintenance of an artificial water level). A plaintiff may also establish an easement by implied reservation. *Schmidt v Eger*, 94 Mich App 728, 733; 289 NW2d 851 (1980). In order to establish an easement by implication, three elements must be shown: "(1) that during the unity of title an apparently permanent and obvious servitude was imposed on one part of an estate in favor of another, (2) continuity, and (3) that the easement is reasonably necessary for the fair enjoyment of the property it benefits." *Id.* at 731.

In the present case, Clark's testimony established that he built the dam at the time when his family owned all the property at issue. Clark stated that the purpose of the dam was to raise the level of the water to hard ground, control runoff on the property and create the pond that was dredged on the land that would eventually be conveyed to plaintiff. Clark testified that the pond was intended to be permanent. This evidence clearly established two servitudes: (1) a servitude on the lands flooded by the erection of the dam in favor of the land on which the dam is located and (2) a servitude on the land occupied by the dam for the maintenance of sufficient water for the pond in favor of the land now owned by plaintiff. *Id.* Further, given the nature of the land, it is readily apparent that the dam is necessary to maintain the water in the pond and wetlands and, therefore, that any change in the dam that permits water to leave the wetlands will adversely affect the level of water in the wetlands and pond. Indeed, the trial court specifically found that defendant placed the culvert to lower the level of the water in the wetlands. Hence, there was evidence sufficient to support the conclusion that the servitude was readily apparent to a purchaser when Clark severed the parcels. *Id.* at 736-737. Finally, Clark testified that the pond was created to control runoff and was used to water his cattle. In addition, plaintiff testified that he purchased the land in part because of the pond and that he used the pond and wetlands for recreation. Plaintiff further stated that, before the drop in water level, he could boat and canoe the pond and wetlands. Consequently, there was evidence from which the trial court could conclude that the artificially high water level was reasonably necessary to the enjoyment of plaintiff's property. *Id.* at 735. Therefore, under the facts of this case, the trial court did not err in concluding that plaintiff had a right to the continued maintenance of an artificially high water level.

The trial court properly exercised its equitable power to grant plaintiff relief under the facts of this case.

Affirmed.

/s/ William B. Murphy
/s/ Michael R. Smolenski
/s/ Bill Schuette

03/21/84 RUSH STIDHAM v. ALGONQUIN LAKE COMMUNITY

COURT OF APPEALS OF MICHIGAN

March 21, 1984

RUSH STIDHAM, D/B/A STIDHAM GRAVEL COMPANY, PLAINTIFF-APPELLANT,
v.
ALGONQUIN LAKE COMMUNITY ASSOCIATION, DEFENDANT-APPELLEE

D. E. Holbrook, Jr., P.j., and S. J. Bronson and R. L. Tahvonen,* JJ.

The opinion of the court was delivered by: Bronson

Plaintiff appeals as of right from an order of summary judgment entered for defendant.

Defendant is a nonprofit corporation consisting of residents of Algonquin Lake. The level of the water of the lake is controlled by a dam operated by defendant. In 1978, 1979, and 1980, defendant obtained permits from the Michigan Department of Natural Resources (DNR) for the purpose of lowering the lake. No permit was issued in 1982, but defendant opend the dam to lower the lake on or about November 30, 1982.

Plaintiff runs a gravel business located approximately one-fourth of a mile from Algonquin Lake. He uses 1,000 gallons of water per minute to wash his gravel. The water comes from the subterranean waters under and around Algonquin Lake through plaintiff's well.

When the 1982 lowering began, plaintiff obtained a restraining order preventing a further lowering. Plaintiff filed an amended complaint for damages, alleging that the 1980 lowering caused him to replace his well at a cost of $5,000 and interrupted his business. Plaintiff sought damages for defendant's alleged unreasonable interference with plaintiff's right to use nearby subterranean water. The trial court dismissed plaintiff's complaint for failure to state a claim for which relief can be granted, GCR 1963, 117.2(1).

In Partrich v Muscat, 84 Mich App 724, 729-730; 270 NW2d 506 (1978), this Court stated the test employed in reviewing summary judgments under GCR 1963, 117.2(1):

"The standard governing this Court's review of a grant or denial of a motion for summary judgment based on GCR 1963, 117.2(1) is well settled. The motion is to be tested by the pleadings alone. Todd v Biglow, 51 Mich App 346; 214 NW2d 733 (1974), lv den 391 Mich 816 (1974). The motion tests the legal basis of the complaint, not whether it can be factually supported. Borman's, Inc v Lake State Development Co, 60 Mich App 175; 230 NW2d 363 (1975). The factual allegations of the complaint are taken as true, along with any inferences or Conclusions which may fairly be drawn from the facts alleged. Unless the claim is so clearly unenforceable as a matter of law that no factual development can possibly justify a right to recover, the motion under this subrule should be denied. Crowther v Ross Chemical & Manufacturing Co, 42 Mich App 426; 202 NW2d 577 (1972)."

The issue before this Court is whether plaintiff has a cause of action against defendant for injury suffered in 1980 when defendant, with the permission of the DNR, opened a dam under defendant's control. Plaintiff claims that defendant breached its duty to use the lake waters in a reasonable manner, consistent with the rights of nearby subterranean water users when, aware that lake lowerings affected the subterranean water level, defendant nonetheless obtained permits in 1978, 1979, and 1980 to lower the lake level.

Defendant's permit was obtained pursuant to the Inland Lakes and Streams Act of 1972, MCL 281.951 et seq.; MSA 11.475(1) et seq. Pursuant to this act, the DNR has authority to issue a permit if it finds that the proposed action will not adversely affect the public trust or riparian rights. The statute directs the DNR to "consider the possible effects of the proposed action upon the inland lake or stream and upon waters from which or into which its waters flow and the uses of all such waters, including uses for recreation, fish and wildlife, aesthetics, local government, agriculture, commerce and industry". MCL 281.957; MSA 11.475(7). A person aggrieved by any action or inaction of the DNR may request a formal hearing on the matter. MCL 281.961; MSA 11.475(11). *fn1

The existence of the Inland Lakes and Streams Act does not preclude plaintiff's common-law remedies. MCL 281.957; MSA 11.475(7) specifically provides that the act "shall not modify the rights and responsibilities of any riparian owner to the use of his riparian water" (emphasis added). Furthermore, the DNR's approval does not ipso facto make defendant's actions reasonable under the circumstances. Pierce v Riley, 81 Mich App 39, 46; 264 NW2d 110 (1978). Therefore, if plaintiff's complaint sufficiently set forth a common-law cause of action, summary judgment was inappropriate.

Plaintiff correctly asserts that defendant would be liable for injury caused by defendant's unreasonable intentional interference with the subterranean water supply. Maerz v United States Steel Corp, 116 Mich App 710, 719-720; 323 NW2d 524 (1982). However, plaintiff does not allege that defendant used or withdrew subterranean waters. Instead, defendant, by opening the dam, merely returned Algonquin Lake to its natural level.

In Goodrich v McMillan, 217 Mich 630; 187 NW 368 (1922), certain cottage owners on an impounded lake brought suit against the owner of a dam which had fallen into disrepair, allowing the level of the water to recede. The defendant had acquired his flowage rights by prescription. The Court rejected the plaintiffs' contention that they had a reciprocal right to have the water maintained at an artificial level.

Goodrich established the rule that ownership of a dam does not impose a duty on the dam owner to maintain the water at the artificial level created by operation of the dam. Those injured by the water's returning to its normal level might maintain an action, however, upon showing that they, themselves, had acquired a prescriptive right to maintenance of the artificial level. Id., p 634.

Plaintiff has failed to allege facts showing that he had acquired a prescriptive right to maintenance of the lake at an artificial level, i.e., plaintiff does not allege a continuous and uninterrupted use of a specific lake level pursuant to a claim of right adverse to the riparian owners, known to and acquiesced in by them. Roberts v Wheelock, 237 Mich 689, 690; 213 NW 72 (1927). Plaintiff's general allegation that defendant knew that lowering the lake affects the subterranean water level does not establish a prescriptive right to maintenance of the lake at a particular level.

Goodrich v McMillan, supra, was followed in Drainage Board v Village of Homer, 351 Mich 73; 87 NW2d 72 (1957), where the owner of a dam was allowed to destroy the dam over the complaints of the riparian landowners that lowering the impoundment would diminish their ability to use subsurface water for irrigation. The Court stated that the riparian owners were "continuously charged, by the very fact of the dam and its gates, with notice that the pond is artificial distinguished from natural and that its level may by the owner be lowered or returned to natural state at any time". Id., p 82.

Plaintiff was similarly charged with notice that defendants, acting with permission of the DNR, might periodically open the dam and lower the level of Algonquin Lake. If plaintiff felt aggrieved by the opening of the dam, plaintiff could have requested a hearing with the DNR. Otherwise, on the facts set forth in plaintiff's complaint, defendant did not breach any duty owed to plaintiff when it opened the dam. The trial court properly dismissed plaintiff's complaint.

Affirmed.

STATE OF MICHIGAN

COURT OF APPEALS

LAWRENCE TERLECKI and MARGARET TERLECKI,

Plaintiffs-Appellees,

v

SILVER LAKE PROPERTY ASSOCIATION OF INDIAN RIVER, MARK W. STEPHENS, ROBERT NIKOLAS, and MARY DOE,

Defendants-Appellants.

and

RANDY STEWART and GREAT LAKES MARINE CONSTRUCTION, INC.

Defendants.

FOR PUBLICATION
April 22, 2008
9:10 a.m.

No. 272541
Cheboygan Circuit Court
LC No. 05-007498-NZ

Before: Markey, P.J., and Meter and Murray, JJ.

PER CURIAM.

Defendants appeal by leave granted the trial court's denial of their motion for summary disposition of plaintiffs' claims of negligence, negligence per se, nuisance, trespass, and conspiracy.[1] The essence of plaintiffs' complaint is that defendants' actions have caused Silver Lake in Cheboygan County to rise, flooding plaintiffs' low-lying forested property. Defendants contend plaintiffs' claims are time-barred because the alleged acts that resulted in the flooding occurred more than three years before plaintiffs filed this lawsuit on October 10, 2005. We conclude the plain text of MCL 600.5805(10) and MCL 600.5827 bar plaintiffs' claim for money damages under any of plaintiffs' liability theories. But the trial court properly determined a

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[1] Plaintiffs also allege in their second amended complaint a violation of Michigan's Natural Resources and Environmental Protection Act, MCL 324 1701 *et seq.*, which defendants assert the trial court dismissed on substantive grounds. We do not address this claim because it was not included in defendants' application for leave and plaintiffs have not cross-appealed.

claim for equitable relief to enforce a flowage easement is subject to the 15-year period set forth in MCL 600.5801(4). Nevertheless, the trial court should have granted defendant's motion for summary disposition because plaintiff had not properly pleaded such a claim. In sum, the trial court should have dismissed plaintiffs' claims for money damages as timed-barred by the statute of limitations, leaving no viable cause of action to support plaintiffs claim for equitable relief. Consequently, we reverse and remand without prejudice to plaintiffs' moving the trial court to amend their complaint. MCR 2.116(I)(5).

I. Summary of Facts and Proceedings

The facts relevant to this appeal are not in dispute. In 1997, defendants - with the permission of the Department of Environmental Quality - replaced with a concrete spillway an existing wooden spillway connecting Silver Lake to the Indian River. Plaintiffs allege that the DEQ permit required the replacement spillway to be the same elevation as the old wooden spillway but that defendants improperly constructed the new concrete spillway 7.32 inches higher than the old. Also, plaintiffs allege that sometime in 1998 the Lake Association caused a 2- by 6-inch board to be placed across the spillway, further elevating the lake. In addition, plaintiffs allege that sometime before November 2001, defendants partially capped a 4-inch PCV pipe running through a culvert, which had also allowed water to drain from Silver Lake into the river. Plaintiffs discovered the cap and removed it in November 2001.[2]

Plaintiffs assert that the effect of defendants' actions was to raise the water level of Silver Lake, causing water from the lake to flood plaintiffs' low-lying wooded property. Plaintiffs contend they did not immediately appreciate what was happening because it was not observable. Although plaintiffs noticed some trees on their wooded wetland began dying in 2001, they did not realize that an elevated lake level was flooding their land or that this was injuring the trees. Plaintiffs allege they only discovered the elevated spillway after having the area surveyed on April 12, 2005. Plaintiffs filed this action on October 10, 2005, seeking an injunction requiring defendants to return the spillway to its previous level and to pay damages for the trees.

The trial court denied defendants' motion for summary disposition that contended plaintiffs' claims were time-barred, stating in pertinent part:

> . . . Cameron [3] states that the "right of flowage is an easement that generally can be acquired only by prescription (if water flows over fifteen years over upland property either constantly or with sufficient intermittent frequency) or by a written instrument such as a deed. *Beaverton Power Company v Wolverine Power Company,* 245 Mich 541, 546; 222 NW 703 (1929)".

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[2] Plaintiffs' counsel conceded at oral argument in the trial court that the PCV pipe was a "minor issue" because it had little effect on the lake level.

[3] 1 Cameron, Michigan Real Property Law: Principles and Commentary (3rd ed), § 3.20, p 123.

> . . . . [A]ssuming the water level was improperly elevated in 1997 causing water to be diverted to Plaintiffs' property in 2001 after the culvert was capped, Plaintiffs' complaint is not time barred. In order to be time barred, the Defendants would have had to acquire a prescriptive easement permitting them to flood Plaintiffs' property by having conducted such activity for fifteen continuous years.
>
> If indeed plaintiffs' claims are true, this is an ongoing wrongful act injuring Plaintiffs' property rights.

Defendants moved for reconsideration, which the trial court denied. For the purpose of deciding the motion, the trial court assumed that defendants committed wrongful acts in 1997 and 2001 when they raised the lake level and caused water to improperly encroach on plaintiffs' property. The court opined this "wrongful impoundment" on plaintiffs' property was ongoing and that Defendants had no easement or other legal right to divert water onto plaintiffs' property. In denying reconsideration, the trial court stated:

> . . . Plaintiff is permitted under law to bring an action to require this wrongful impoundment of water to cease and desist as the Defendants have no legal right for this activity. If the Defendants had been engaged in this conduct for 15 years prior to the litigation, then they might have acquired a prescriptive easement which would have given them a right to continue this activity. They did not and Plaintiff is entitled to challenge its contrivance.

The trial court left unresolved how far back plaintiffs could claim damages.

II. Standard of Review

This Court reviews de novo the trial court's decision on a motion for summary disposition under MCR 2.116(C)(7). *Trentadue v Gorton*, 479 Mich 378, 386; 738 NW2d 664 (2007). Summary disposition is proper when a claim is barred by the statute of limitations. *Waltz v Wyse*, 469 Mich 642, 647; 677 NW2d 813 (2004). When addressing a C (7) motion, the trial court must accept as true the allegations of the complaint unless contradicted by the parties' documentary submissions. *Patterson v Kleiman*, 447 Mich 429, 434 n 6; 526 NW2d 879 (1994). When the material facts are not disputed, this Court reviews de novo as a question of law whether a claim is barred by the statute of limitations. *Trentadue*, *supra* at 386. The interpretation of statutes also requires de novo review. *Id.*

III. Analysis

A. Money Damages

Defendants argue plaintiffs filed an action asserting claims of negligence, negligence per se, nuisance, trespass, and conspiracy, not an action to quiet title to property. Therefore, defendants argue, the trial court erred by applying the 15-year limitation period of MCL 600.5801(4) to plaintiffs' claims. Defendants argue that the proper statute of limitations is MCL 600.5805(10): "The period of limitations is 3 years after the time of the death or injury for all other actions to recover damages for the death of a person, or for injury to a person or property."

Defendants rely principally on *Horvath v Delida*, 213 Mich App 620; 540 NW2d 760 (1995), which applied the three-year statutory period of limitation to claims of negligence, trespass and nuisance flooding injury to property. Defendants further argue that plaintiffs' civil conspiracy claim takes on the limitations period of the underlying wrongful act.

On appeal, plaintiffs argue that defendants concealed the fact that the replacement spillway was higher than the old spillway, contrary the permit the DEQ issued and therefore, this Court should apply the discovery rule by which a claim does not accrue until the plaintiff discovers or should have discovered the alleged wrongful act. *Johnson v Caldwell*, 371 Mich 368, 379; 123 NW2d 785 (1963).[4] Plaintiffs also distinguish *Horvath* on the grounds that in *Horvath* the water table changed by two to five feet but here the lake level rose only 7 ½ inches. Further, plaintiffs assert the trial court properly invoked the continuous tort doctrine. Specifically, Plaintiffs contend the flooding caused by the raised spillway is a continuing tort of trespass and nuisance, citing *Defnet v Detroit*, 327 Mich 254; 41 NW2d 539 (1950),[5] *DiFronzo v Village of Port Sanilac*, 166 Mich App 148; 419 NW2d 756 (1988),[6] and *Hodgeson v Genesee Co Drain Comm'r*, 52 Mich App 411; 217 NW2d 395 (1974).[7]

On the other hand, defendants argue the trial court erred by applying the continuing wrongful acts doctrine to deny defendants' motion for summary disposition. They contend the trial court confused the fact of alleged finite wrongful acts (in 1997 and 2001) with the continuing harmful effects of those acts. Defendants point to *Horvath* in which the plaintiffs alleged that the defendants' single wrongful act (dredging) resulted in continuing flooding to their property. The *Horvath* Court held that the plaintiffs "misapprehend the crux of the doctrine: a continuing wrong is established by continual tortious *acts,* not by continual harmful effects from an original, completed act." *Id.* at 627. Moreover, defendants argue the continuing

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[4] We note that in *Trentadue v Gorton*, 479 Mich 378, 393; 738 NW2d 664 (2007), our Supreme Court specifically overruled *Johnson* and its progeny with respect to the judicially crafted discovery rule. The Court held that "the statutory scheme is exclusive and thus precludes this common law practice of tolling accrual based on discovery in cases where none of the statutory tolling provisions apply." *Trentadue, supra* at 389.

[5] The *Defnet* Court held a 1945 action against the city for maintaining an active sewer under the plaintiffs' property since 1915 (when the city vacated an alley) was not time-barred because "[w]here there are continuing wrongful acts within the period limited by the statute (CL 1948, § 609.13 [Stat Ann § 27.605]), recovery is not barred." *Defnet, supra* at 258.

[6] The village had constructed a walkway across the plaintiffs' lakefront property, as well as harbor facilities that interfered with the plaintiffs' littoral rights. *DiFronzo*, 151-152. The Court viewed the plaintiff's claim as one of inverse condemnation. The Court also opined, "If a nuisance is of a continuing nature the period of limitations does not begin to run from the date of the first act." *Id.* at 156, citing *Hodgeson, supra at* 413.

[7] In *Hodgeson*, like *Defnet*, a storm sewer ran underneath the plaintiffs' property. "The law is clear that where there are wrongful acts of a continuing nature, the statute of limitations does not begin to run from the date of the first act." *Hodgeson, supra* at 413, citing *Defnet.*

wrongful acts doctrine no longer applies in Michigan in light of *Garg v Macomb Co Community Mental Health Services*, 472 Mich 263; 696 NW2d 646, amended 473 Mich 1205 (2005).[8]

We conclude that Plaintiffs' claim for money damages for injuries to plaintiffs' property is a claim for injury to property within the plain text of MCL 600.5805(10), whether the claim is for the death of trees or for the submersion of the land. The claim accrued, "[e]xcept as otherwise expressly provided . . . at the time the wrong upon which the claim is based was done regardless of the time when damage results." MCL 600.5827. Whether "the wrong" is viewed as the raising of the spillway (1997), or the capping of the culvert (2001), or the flooding of plaintiffs' property and resulting death of tress (2001 and before), plaintiffs 2005 lawsuit was filed more than three years after the time of the injury to property. MCL 600.5805(10). Consequently, plaintiffs' money damage claim is time-barred.

The judicially created discovery rule cannot save plaintiffs' claim. *Trentadue*, *supra* at 389, 393. Plaintiffs' reliance on fraudulent concealment, MCL 600.5855, is also misplaced. Defendants did nothing to conceal the height of the spillway or the capping of the culvert, which was discovered and removed by plaintiffs in 2001. The statutory scheme of limitations periods is exclusive and precludes tolling the accrual of a claim based on discovery where no statute tolls the running of limitations period. *Trentadue*, *supra* at 389.

Plaintiffs fail to gain the benefit of a longer period of limitations by alleging a count of civil conspiracy. Defendants correctly cite *Gilbert v Grand Trunk Western R*, 95 Mich App 308, 313; 290 NW2d 426 (1980), which cites *Roche v Blair*, 305 Mich 608, 614-615; 9 NW2d 861 (1943), for the proposition that "the gravamen of the action is not the conspiracy but the wrongful act." Consequently, an allegation of conspiracy is "superfluous" as far as determining the applicable statute of limitations. *Gilbert*, *supra* at 313. It follows that the conspiracy claim takes on the limitations period of the underlying wrong that was the object of the conspiracy. Further, it is the wrongful act, not the agreement to commit a wrongful act that commences the running of the limitations period. "The conspiracy standing alone without the commission of acts causing damage would not be actionable. The cause of action does not result from the conspiracy but from the acts done." *Roche*, *supra* at 614. Here, plaintiffs alleged a conspiracy to erect the replacement spillway higher than the DEQ permit allowed. But the wrongful act occurred in 1997 when the spillway was replaced, allegedly higher than permitted, resulting in the alleged injuries to property occurring in 2001 (trees) or earlier (flooding). Therefore, MCL 600.5805(10) and MCL 600.5827 control the limitations period and accrual of plaintiffs conspiracy claim. The conspiracy claim accrued at the latest in 2001 and was time-barred in 2005 by the three-year limitations period of § 5805(10).

Plaintiffs also argue that their claim is not barred by the statute of limitations because the flooding of their property caused by the raised spillway constitutes a continuing tort of either

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[8] *Garg* was a discrimination case in which our Supreme Court overruled the "continuing violations" doctrine of *Sumner v Goodyear Tire & Rubber Co*, 427 Mich 505; 398 NW2d 368 (1986) because it was contrary to the plain text of MCL 600.5805 and MCL 600.5827. *Garg*, *supra* at 266, 281-284, 290.

trespass or nuisance. Claims of trespass and nuisance include overlapping concepts and are difficult to distinguish. *Traver Lakes Community Maintenance Ass'n v Douglas Co*, 224 Mich App 335, 344; 568 NW2d 847 (1997). "[T]respass is an invasion of the plaintiff's interest in the exclusive possession of his land, while nuisance is an interference with his use and enjoyment of it." *Adams v Cleveland-Cliffs Iron Co*, 237 Mich App 51, 59; 602 NW2d 215 (1999) (citations omitted). In Michigan, recovery for trespass to land "is available only upon proof of an unauthorized direct or immediate intrusion of a physical, tangible object onto land over which the plaintiff has a right of exclusive possession." *Id.* at 67. Moreover, the intrusion must be intentional. *Cloverleaf Car Co v Phillips Petroleum Co*, 213 Mich App 186, 195; 540 NW2d 297 (1995). "If the intrusion was due to an accident caused by negligence or an abnormally dangerous condition, an action for trespass is not proper." *Id.*, citing Prosser & Keeton, Torts (5th ed), § 13, pp 73-74. An actor is "subject to liability for private nuisance for a nontrespassory invasion of another's interest in the private use and enjoyment of land if (a) the other has property rights and privileges in respect to the use or enjoyment interfered with, (b) the invasion results in significant harm, (c) the actor's conduct is the legal cause of the invasion, and (d) the invasion is either (i) intentional and unreasonable, or (ii) unintentional and otherwise actionable under the rules governing liability for negligent, reckless, or ultrahazardous conduct." *Cloverleaf Car Co*, *supra* at 193 (citation omitted).

Assuming for the sake of analysis that plaintiffs have properly pled and the circumstances support a claim for either trespass or nuisance, plaintiffs still seek to recover money damages for injury to property. Our Supreme Court has recently opined that the "'continuing violations' doctrine is contrary to the language of § 5805." *Garg*, *supra* at 290. Therefore, the Court held that "the doctrine has no continued place in the jurisprudence of this state." *Id.* The *Garg* case was a discrimination lawsuit in which the Court held that for the plaintiff's claim to survive the plain text of the three-year limitations period of § 5805(10) and that of the accrual statute, § 5827, the plaintiff was required to file her claim within three years of an adverse employment act. *Garg*, *supra* at 281-282. The holding of *Garg* does not appear limited to discrimination cases but rather the Court applied plain text the limitations and accrual statutes at issue here.

Further, this Court's decision in *Horvath* does not support defendants' continuous violations theory. In *Horvath*, the defendants obtained a Department of Natural Resources permit and dredged the bottom of a Roscommon County lake in 1983. The plaintiffs noticed that the lake level was began to rise that year and continued to. Eventually, in 1991 and 1992 the water entered the plaintiffs' home, and their well and septic system failed. The plaintiffs sued in 1992, alleging the defendants had negligently opened underground springs resulting in the rising lake level that flooded the plaintiffs' property. The *Horvath* Court held that a flooding cause of action accrues with respect to permanent as opposed to transient damage when "the land is first visibly damaged." *Horvath*, *supra* at 625. Since the plaintiffs noticed damage in 1985, their 1992 claim was time-barred. *Id.* at 626. The Court also addressed the continuing wrongful acts doctrine and distinguished the main cases on which plaintiffs rely: *Defnet* (trespass); *DiFronzo*) (trespass & nuisance); *Moore v City of Pontiac,* 143 Mich App 610, 614; 372 NW2d 627 (1985) (nuisance); and *Hodgeson* (nuisance). The *Horvath* Court opined:

> In seeking to apply the continuing-wrongful-acts doctrine in this case, plaintiffs misapprehend the crux of the doctrine: a continuing wrong is established by continual tortious *acts,* not by continual harmful effects from an original,

completed act. See, e.g., *Defnet, supra* (the continuing-wrongful-acts doctrine applied where the defendants' maintenance of an *active* sewer on the plaintiffs' property for nearly thirty years constituted a continuing trespass); *Difronzo v Port Sanilac,* 166 Mich App 148; 419 NW2d 756 (1988) (the defendants' building of a harbor and necessary facilities on Lake Huron bottom land adjacent to the plaintiff's property constituted an ongoing nuisance); *Moore, supra* (operation of a sanitary landfill constituted a continuing nuisance); *Oakwood Homeowners Ass'n, Inc* [*v Ford Motor Co*, 77 Mich App 197; 258 NW2d 475 (1977)] (operation of manufacturing plants that caused air pollution constituted a continuing tort); *Hodgeson v Genesee Co Drain Comm'r*, 52 Mich App 411; 217 NW2d 395 (1974) (maintenance of storm sewer drain under the plaintiffs' property, which caused periodic flooding, constituted a continuing nuisance).

Here, defendants are alleged to have committed a single tortious act in 1982 when they dredged the lake, and from that single act plaintiffs' property suffered noticeable permanent damage beginning as early as 1985 and intensifying over time. Accordingly, because plaintiffs have only established aggravated ill effects from a single tortious act, their reliance on the continuing-wrongful-acts doctrine is misplaced. [*Horvath, supra* at 627-628.]

Defendants persuasively argue that as in *Horvath*, plaintiffs have alleged at most only two distinct tortuous acts occurring in 1997 (spillway replacement) and the 2001 (capped culvert). The flooding and tree damage since 2001 are merely the harmful effects of the completed tortuous acts. The distinctions noted in *Horvath* with respect to the continuous wrongful act doctrine apply equally to the present case. Defendants have not physically intruded on or under plaintiffs' property with an active sewer (*Defnet*), nor annually delivered water through a sewer under plaintiffs' property to plaintiffs' basement (*Hodgeson*). Neither have defendants constructed a walkway across plaintiffs' property and physically interfered with their riparian rights (*Difronzo*). Defendants also did not within one year of plaintiffs' lawsuit build "a tire shredding operation" that "made a loud shrill-like scream every five seconds while being utilized" and "gave off noxious odors and . . . produced soot, particles and fibers which entered plaintiffs' home." *Moore, supra* at 612. Indeed, defendants have performed no wrongful acts causing water to be diverted from their own property to plaintiffs'. Rather, plaintiffs allege that defendants have obstructed the rate of the flow of water over the now raised spillway that naturally accumulates on their own property and then spreads across defendants'.

Several other panels of this Court have followed the *Horvath* Court's analysis by severing tortuous acts from the harmful effects of those acts. See *Attorney General v Harkins*, 257 Mich App 564, 572; 669 NW2d 296 (2003); *Jackson Co Hog Producers v Consumers Power Co*, 234 Mich App 72, 81-82; 592 NW2d 112 (1999) (trespass and nuisance); and *Forest City Enterprises, Inc v Leemon Oil Co,* 228 Mich App 57, 76 n 7; 577 NW2d 150 (1998) (nuisance). But also see, *Travers Lakes Community Maintenance Ass'n, supra* at 346-348 (although applying *Horvath* to the plaintiff's negligence claim the Court distinguished claims for nuisance because "'nuisance is a condition and not an act or failure to act'" (citations omitted).

We conclude that regardless of the legal theory plaintiffs advance, their claim for money damages is based on injury to property, i.e., either the death of trees or the submersion of their land. In light of *Garg*, whether these claims are timely is determined by the plain text of MCL

600.5805(10). Plaintiffs claim accrued "[e]xcept as otherwise expressly provided . . . at the time the wrong upon which the claim is based was done regardless of the time when damage results." MCL 600.5827. Whether the alleged "wrong" is the raising of the spillway (1997), the capping of the culvert (2001) or even the flooding of plaintiffs' property resulting in the loss of tress (2001 and before), plaintiffs 2005 lawsuit was filed more than three years after the property was injured. MCL 600.5805(10). Plaintiffs point to no statute that extends the limitations period. *Trentadue*, *supra* at 389. Consequently, plaintiffs' claims for money damages are time-barred; consequently, the trial court erred in not granting defendants summary disposition as to this portion of plaintiffs' complaint.

B. Equitable Relief

We conclude that the trial court erred in denying defendants' motion for summary disposition of that portion of plaintiffs' complaint seeking equitable relief.

To the extent plaintiffs' complaint is premised on defendants' alleged violation of the DEQ permit, it is time-barred. Plaintiffs' complaint alleges they are entitled to relief because defendants installed the new spillway higher than the DEQ permit allowed. Such a theory would raise the issue of whether plaintiffs have standing to enforce the requirements of the permit. Assuming plaintiffs' have standing to challenge the conduct, case law indicates the proper statute of limitations is the general six-year statute of limitations applicable to "[a]ll other personal actions." MCL 600.5813. The statutes of limitations "apply equally to all actions whether equitable or legal relief is sought." MCL 600.5815. This Court has applied the six-year limitation period to the Attorney General's "equitable action to restore wetlands that were altered in violation of a permit issued under Part 303 (Wetland Protection) of the Natural Resources and Environmental Protection Act (NREPA), MCL 324.30301 *et seq*." *Harkins*, *supra* at 566. So, even assuming that plaintiffs have standing to enforce the terms and conditions of the DEQ permit, their 2005 action regarding the 1997 spillway construction is barred by the six-year statute of limitations.

Although plaintiffs do not clearly allege it, we view the essence of plaintiffs' complaint for equitable relief as one to enforce a flowage easement over defendants' property.[9] The trial court applied the 15-year limitations period of MCL 600.5801(4), reasoning that because it would take that long for defendants to obtain a prescriptive easement to flow over plaintiffs' property, plaintiffs should have that long to seek redress from a court to prevent defendants from obtaining a prescriptive easement to flood plaintiffs' property.

MCL 600.5801(4) provides:

> No person may bring or maintain any action for the recovery or possession of any lands or make any entry upon any lands unless, after the claim or right to make the entry first accrued to himself or to someone through whom he claims, he

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[9] As discussed *infra*, a flowage easement could arise from long-standing flow of water. We assume plaintiffs could allege facts that would support such a claim. See MCR 2.116(I)(5).

commences the action or makes the entry within the periods of time prescribed by this section.

* * *

(4) In all other cases under this section, the period of limitation is 15 years.

A claim to enforce or prevent the creation of an easement does not neatly fit into a statute of limitations barring recovery of possession of real property because an easement is a not a possessory right. See *Tittiger v Johnson*, 103 Mich App 437, 440-441; 303 NW2d 26 (1981) (citations omitted). Rather, an easement is "a right to use the land burdened by the easement rather than a right to occupy and use the land as an owner." *Dep't of Natural Resources v Carmody-Lahti Real Estate, Inc*, 472 Mich 359, 378; 699 NW2d 272 (2005) (citations omitted). An owner of an easement cannot not displace the possessor or the owner of the land, but he has a qualified right to possession so far as may be necessary for its enjoyment. *Id.* at 378 n 39, quoting *McClintic-Marshall Co v Ford Motor Co,* 254 Mich. 305, 317; 236 NW 792 (1931).

The specific easement at issue is somewhat amorphous. "The right of flowage is an easement that can only be acquired by prescription or by a writing such as a deed." *Lenawee Co Bd of Comm'rs v Abraham*, 93 Mich App 774; 287 NW2d 371 (1979), citing *Beaverton Power Co v Wolverine Power Co*, 245 Mich 541, 546; 222 NW 703 (1929). As stated in headnote 3 of *Abraham, supra*, it is an easement "to flow water over another's land." The easement may be one of two different types. In the *Abraham* and *Beaverton* cases, it was the right to erect a dam that flooded or flowed water onto upstream properties. The existence of this type of flowage easement, however, does not extend a reciprocal right to the servient estate to have the artificial water level maintained. See *Drainage Bd v Village of Homer*, 351 Mich 73, 80-83; 87 NW 72 (1957), and *Goodrich v McMillan*, 217 Mich 630, 633; 187 NW 368 (1922). "'The fact that the exercise of the easement is of advantage to the owner of the servient estate will give him no right to insist on the exercise of the easement on the part of the dominant owner. An easement exists for the benefit of the dominant estate alone, and the servient owner acquires no right to insist on its continuance, or to ask for damages on its abandonment.'" *Id.*, quoting and adopting 3 Farnham on Waters and Water Rights at 2402-2403. Thus, the owner of the dominant estate may raise or lower the water level between the natural low-water mark and the easement high high-water mark. *Drainage Bd, supra* at 83.

But from the perspective of the upstream property owners, a flowage easement may arise from the natural or long-existing rate of flowing water away from the upstream property over the downstream properties. This was the essence of *Cranson v Snyder*, 137 Mich 340; 100 NW 674 (1904), and *Carley v Jennings*, 131 Mich 385; 91 NW 634 (1902), on which plaintiffs rely in asserting a right to injunctive relief to enforce a right to maintain the spillway at its pre-existing level. "It is the settled law of this State that the natural flowage of water from the upper estate is a natural servitude which the owner of the lower estate must bear." *Id.* at 387. The Court in both *Cranson* and *Carley* affirmed trial court decrees to enjoin obstructions of a long-existing rate of flow of water over the servient property.

Here, plaintiffs seek to invoke the equity jurisdiction of the court to prevent the flooding of their property. They seek both to preclude defendants from creating a prescriptive easement of flowage which would then authorize the continuation of the flooding and to enforce their own

flowage easement in the pre-existing rate of water flow over the spillway that defendants control. Assuming that plaintiffs have an easement in the pre-existing rate of flow over the old spillway, or stated differently, that defendants do not already have a prescriptive easement to flow plaintiffs' property, plaintiffs' own flowage easement arises from the common law, not the DEQ permit. Consequently, the general six-year statute of limitations of MCL 600.5813 does not necessarily apply.

Indeed, some cases suggest that because equitable relief redresses future harm, statutes of limitations do not apply. See, e.g., *Wayne Co Chief Executive v Governor*, 230 Mich App 258, 274; 583 NW2d 512 (1998), citing *Taxpayers Allied For Constitutional Taxation v Wayne County*, 450 Mich 119, 128-129; 537 NW2d 536 (1995) (the statute of limitations does not affect a claim for injunctive relief to prevent a future wrong). In both of these cases, however, the issue addressed was enforcing constitutional limits on taxation. Furthermore, neither case discussed the effect of MCL 600.5815, as this Court did in *Harkins*, *supra* at 570-571. In addition, the Court in *Taxpayers*, *supra*, noted that, "statutes of limitation may apply by analogy to equitable claims." *Taxpayers*, *supra* 127 n 9. "If legal limitations periods did not apply to analogous equitable suits, 'a plaintiff [could] dodge the bar set up by a limitations statute simply by resorting to an alternate form of relief provided by equity.'" *Id.*, quoting *Lothian* v *Detroit,* 414 Mich 160, 169; 324 NW2d 9 (1982).

We conclude the trial court correctly applied the 15-year limitations period of MCL 600.5801(4) to plaintiffs' equitable claim seeking to preclude defendants from obtaining a prescriptive flowage easement which would flood their property. "An easement by prescription results from use of another's property that is open, notorious, adverse, and continuous for a period of fifteen years." *Plymouth Canton Community Crier, Inc v Prose*, 242 Mich App 676, 679; 619 NW2d 725 (2000), citing MCL 600.5801 and *Goodall v Whitefish Hunting Club*, 208 Mich App 642, 645; 528 NW2d 221 (1995). Likewise, a flowage easement may arise "from an open, notorious, continuous, and adverse use across the land of another for a period of 15 years." *Cook v Grand River Hydroelectric Power Co, Inc,* 131 Mich App 821, 826; 346 NW2d 881 (1984). Also, a prescriptive flowage easement may be lost by a 15-year period of continuous nonuse. *Id.* at 827, citing *McDonald v Sargent*, 308 Mich 341; 13 NW2d 843 (1944). The owner of flooded property "may at any time, during the prescriptive period of flowage, protect his rights . . . ." *Drainage Bd, supra at* 80, citing *Goodrich, supra* at 633. "There is not an instant during the time that the prescriptive period is running when [the owner of the servient estate] could not compel the owner of the dam to remove it . . . ." *Id.* at 633, quoting 3 Farnham on Waters and Water Rights at 2406. Thus, the statute of limitation on actions to prevent a prescriptive flowage easement from arising is the 15-year limitation period of MCL 600.5801(4). This same reasoning would justify invoking the 15-year limitations period to an action to remove obstructions to a natural flowage easement. See *Longton v Stedman*, 196 Mich 543, 545; 162 NW 947 (1917) (an easement may be enforced at any time up to its extinguishment by adverse possession).

But because a claim for equitable relief to enforce a flowage easement would not be time-barred does not mean that plaintiffs have properly pleaded a cause of action to do so. "'It is not the remedy that supports the cause of action, but rather the cause of action that supports a remedy.'" *Henry v The Dow Chemical Co*, 473 Mich 63, 96-97; 701 NW2d 684 (2005), quoting *Wood v Wyeth-Ayerst Labs,* 82 SW3d 849, 855 (Ky, 2002).

It is well settled that an injunction is an equitable remedy, not an independent cause of action. *Klay v United HealthGroup, Inc.*, 376 F3d 1092, 1100 (CA11, 2004); *Fletcher v Conoco Pipe Line Co.*, 129 F Supp 2d 1255, 1266 (WD Mo, 2001). As the *Fletcher* Court stated, "[p]laintiffs must allege some wrongful conduct on the part of Defendant for which their requested injunction is an appropriate remedy." Here, plaintiffs' second amended complaint contained five separate counts, and after reciting these specific claims, requested both compensatory and equitable relief. However, because we have concluded that plaintiffs' tort claims were time-barred and the trial court had dismissed plaintiffs' statutory claim, plaintiffs currently have no viable claim against defendants; therefore, equitable relief in the form of an injunction is unavailable. Although this is the posture of this case now, on remand plaintiffs may move to amend their complaint and then seek equitable relief.

C. Conclusion

We hold the plain text of MCL 600.5805(10) and MCL 600.5827 bar plaintiffs' claim for money damages under any of plaintiffs' liability theories. With respect to plaintiffs' claim for equitable relief to either enforce a natural flowage easement or preclude the creation of a prescriptive flowage easement, we hold the trial court correctly applied the 15-year limitation period of MCL 600.5801(4). But because plaintiffs have no properly pleaded cause of action for equitable relief currently before the court, we must reverse the denial of defendants' motion for summary disposition.

We reverse and remand for further proceedings without prejudice to plaintiffs' moving the trial court to amend their complaint. We do not retain jurisdiction.

/s/ Jane E. Markey
/s/ Patrick M. Meter
/s/ Christopher M. Murray

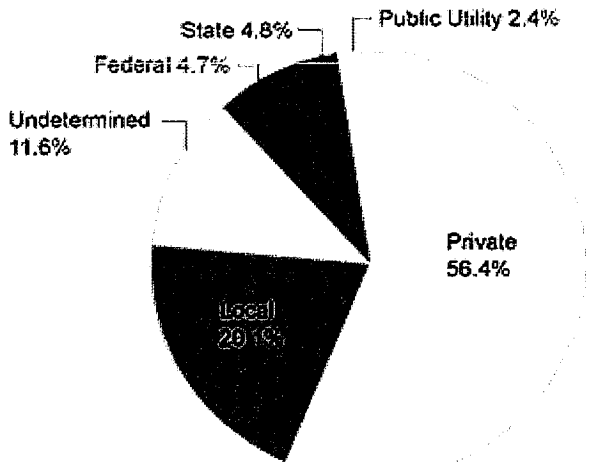
FEMA

Dam Ownership in the United States

Dam owners are responsible for the safety and the liability of the dam and for financing its upkeep, upgrade, and repair.

Although most infrastructure facilities, such as roads, bridges, and sewer systems, are owned by public entities, the majority of dams in the United States are privately owned. In general, very large dams are owned and regulated by the Federal Government.

Given the diffuse nature of dam ownership versus regulation in the United States, it is apparent that dam safety and security are often not solely a federal, state, or local issue.



Source: National Inventory of Dams, February 2005

The safety and security of a dam can affect persons and property across local, state, and even national borders. An incident in one area can affect commerce, navigation, and power generation and distribution, or it can cause severe damage in another area. As a result, there is a reasonable federal role to coordinate federal, state, and local efforts to provide dam safety and security to citizens.

To encourage individual and community responsibility for dam safety, FEMA coordinates partnerships through two federal organizations. Visit National Dam Safety Program Partners for more information.

FEMA

Dam Failure

There are are more than 80,000 dams in the United States, according to the 2007 update to the National Inventory of Dams. Approximately one third of these pose a "high" or "significant" hazard to life and property if failure occurs.

Dam failure or levee breeches can occur with little warning. Intense storms may produce a flood in a few hours or even minutes for upstream locations. Flash floods occur within six hours of the beginning of heavy rainfall, and dam failure may occur within hours of the first signs of breaching.

Other failures and breeches can take much longer to occur, from days to weeks, as a result of debris jams or the accumulation of melting snow.

How can I protect myself from dam failure?

- What to do before a dam failure
- What to do during a flood
- What to do after a flood

FEMA

Why Dams Fail

A "dam" is an artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material for the purpose of storage or control of water (different types of dams). Dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam.
- Deliberate acts of sabotage.
- Structural failure of materials used in dam construction.
- Movement and/or failure of the foundation supporting the dam.
- Settlement and cracking of concrete or embankment dams.
- Piping and internal erosion of soil in embankment dams.
- Inadequate maintenance and upkeep.

Dam Failures in the United States
A series of dam failures in the 1970's caused the Nation to focus on inspecting and regulating dams.

- On February 26, 1972, a tailings dam owned by the Buffalo Mining Company in Buffalo Creek, West Virginia failed. In a matter of minutes, 125 people were killed, 1,100 people were injured, and over 3,000 were left homeless.

- On June 5, 1976, Teton Dam, a 123-meter high dam on the Teton River in Idaho, failed, causing $1 billion in damage and leaving 11 dead. Over 4,000 homes and over 4,000 farm buildings were destroyed as a result of the Teton Dam failure.

- In November 1977, Kelly Barnes Dam in Georgia failed, killing 39 people, most of them college students.

The Johnstown Flood
At 4:07 p.m. on the afternoon of May 31, 1889, the residents of Johnstown, Pennsylvania heard a low rumble that grew to a "roar like thunder." After a night of heavy rains, the South Fork Dam had failed, sending tons of water crashing down the narrow valley. Boiling with huge chunks of debris, the wall of flood water grew at times to 60 feet high, tearing downhill at 40 miles per hour and leveling everything in its path.

Thousands desperately tried to escape the wave. Those caught by the wave found themselves swept up in a torrent of oily, muddy water, surrounded by tons of grinding debris, which crushed some, provided rafts for others. Many became helplessly entangled in miles of barbed wire from a destroyed wire works.

Although it was over in 10 minutes, for some the worst was yet to come. Darkness fell, thousands were huddled in attics, others were floating on the debris, while many more had been swept downstream to the old Stone Bridge at the junction of the rivers. Piled up against the arches, much of the debris caught fire, entrapping forever 80 people who had survived the initial flood wave.

FEMA

What to Do Before a Dam Failure

Knowing your risk, making sure an Emergency Action Plan (EAP) is in place, and evacuating when directed by emergency response officials are the most important steps you can take to staying safe from a dam failure. For information on how to prepare for a flood, visit Before A Flood.

Ways to Plan Ahead

- Know your risk. Do you live downstream from a dam? Is the dam a high-hazard or significant-hazard potential dam? To find out, contact your state or county emergency management agency or visit the National Inventory of Dams (NID) or the Association of State Dam Safety Officials (ASDSO).
- Find out who owns the dam and who regulates the dam. This information also should be available from your state or county emergency management agency, NID, or ASDSO.
- Once you determine that you live downstream from a high-hazard or significant-hazard potential dam and find out who owns the dam, see if a current EAP is in place for the dam. An EAP is a formal document that identifies potential emergency conditions at a dam and specifies preplanned actions to be followed to reduce property damage and loss of life. An EAP specifies actions the dam owner should take to take care of problems at the dam. It also includes steps to assist the dam owner in issuing early warning and notification messages to responsible downstream emergency management authorities of the emergency.
- If there is a dam failure or an imminent dam failure and you need to evacuate, know your evacuation route and get out of harm's way. In general, evacuation planning and implementation are the responsibility of the state and local officials responsible for your safety. However, there may be situations where recreational facilities, campgrounds, or residences are located below a dam and local authorities will not be able to issue a timely warning. In this case, the dam owner should coordinate with local emergency management officials to determine who will warn you and in what priority.

GRADE D

DAMS

ASCEMI
American Society of Civil Engineers Michigan Section

OVERVIEW

Over 90% of Michigan's 2,581 dams will reach or exceed their design life by 2020. Many dams are abandoned, no longer serve any useful purpose, and pose safety hazards to downstream residents. No funding is currently available in Michigan to help dam owners repair, rehabilitate or remove aging dams.

BACKGROUND

Michigan has supported the intensive use of rivers for economic development throughout its history. Dams provide tremendous benefits but also pose great risks to public safety, local and regional economies and the environment. Historically, some of the largest disasters in the United States have resulted from dam failures. The 2003 Silver Lake Dam failure in Michigan resulted in $100 million in damages and economic losses of $1 million per day. Over the last decade, as more aging dams require repairs, growing concern about dam safety and environmental quality has become more prevalent. Many dam owners -including public agencies - do not have the financial capability to repair and maintain their dams or remove them.

CURRENT CONDITIONS

The Michigan Department of Environmental Quality's (MDEQ) Dam Safety Unit maintains records showing that 93% of Michigan's dams will have reached their design life of 50 years by 2020 and that 166 of them built before 1900 have already passed this design life by a factor of two. With the exception of 110 hydropower dams only a few dams (mostly lake level control structures) produce any income or have a mechanism for funding needed maintenance or repairs. MDEQ's Dam Safety Unit requires that all dams over 6-ft-high and impounding over 5 acres at flood stage are to be inspected every 3 to 5 years, depending on its hazard potential rating. While this ensures that any dam at serious risk of failure will be identified as such, it still takes money to repair, rehabilitate or remove them. Often, many deficiencies identified during dam inspections are left uncorrected due to funding shortfalls.

FUNDING NEEDS AND OPTIONS

Funding for Michigan's aging dams is reaching crisis proportions. One study estimates that 120 Michigan dams need at least $50 million for repairs or rehabilitation2. Many municipalities and other owners of dams can not afford to repair and replace or remove their dams on their own. As Michigan's dams continue to age the need for state or federal funding or funding from some other source will become more acute.

GRADE

Owners of Dams that do not generate revenue generally do not set aside funds for their eventual repair, rehabilitation or removal. The lack of State or other public-funding mechanisms to assist dam owners with these tasks causes inadequate or crumbling dams to go unattended, posing significant safety hazards to downstream residents and local and regional economies. While the actual condition of our dams is generally better than a "D", the fact that many dams in need of repair, replacement or removal go without warrants the grade of "D."

CONCLUSIONS

The lack of a source of stable, reliable rehabilitation funding for the owners of Michigan's aging dams is a critical infrastructure safety issue, given the condition and age of our dams.

RECOMMENDATIONS

- Fully fund and staff Michigan's dam-safety program.
- Educate the public on the need for proper maintenance and repair of dams.
- Establish a dedicated State fund of at least $50,000,000 for the repair, replacement, or removal of unsafe dams.
- Seek a federal funding program to assist with loans and matching grants for repair, replacement or removal of unsafe dams.

SOURCES

1. MDEQ Dam Safety Unit Dams Data Base.
2. Coscarelli, M. and Hegarty, J. The Growing Crisis of Aging Dams: Policy Considerations and Recommendations for Michigan Policy Makers; Michigan River Partnership, 2007.

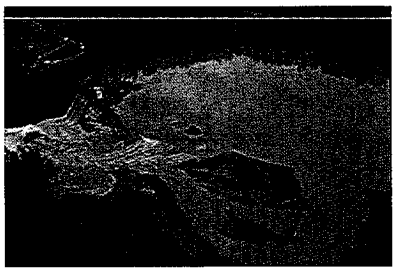
Association of State Dam Safety Officials

Dam Safety 101

Dam Safety 101
- Introduction to How Dams Work
- Top Issues Facing the Dam Safety Community
- Dams are a Part of the National Infrastructure
- Dam Safety Regulation in the U.S.
- What Does ASDSO Do to Improve Dam Safety
- The Good News
- The Levee Safety Issue

Dam Safety in the States
Dam Safety at the Federal Level
Dam Failures and Incidents
Press Room & News
Dam Security
Public Safety & Awareness

Top Issues Facing the Dam Community



1. Risk of Failure

Driving every other issue and all activities within the dam safety community is the risk of dam failure. Although the majority of dams in the U.S. have responsible owners and are properly maintained, still many dams fail every year. From 2005 to 2009, the States reported 132 dam failures. A life was recently lost in New Hampshire as a result of a dam failure. In 2006, seven people were killed in Hawaii when a deficient dam broke. Dam and downstream repair costs resulting from failures in 23 states reporting in one recent year totaled $54.3 million.

Dam failures are most likely to happen for one of five reasons:

- Overtopping caused by water spilling over the top of a dam
- Structural failure of materials used in dam construction
- Cracking caused by movements like the natural settling of a dam
- Inadequate maintenance and upkeep
- Piping—when seepage through a dam is not properly filtered and soil particles continue to progress and form sink holes in the dam

Historically, dams that failed had some deficiency, as characterized above, which caused the failure. These dams are typically termed "unsafe." Currently, there are about 4,400 "unsafe" dams in the U.S. There are unsafe dams in almost every state. (A majority of states and federal agencies define an "unsafe" dam as one that has been found to have hydraulic or structural deficiencies that leave it more susceptible to failure.)

2. The Increasing Hazard

Dams are innately hazardous structures. Failure or mis-operation can result in the release of the reservoir contents--this includes water, mine wastes or agricultural refuse--causing negative impacts upstream or downstream or at locations remote from the dam. Negative impacts of primary concern are loss of human life, economic loss including property damage, lifeline disruption and environmental damage.

Some dams are considered to have a greater hazard potential than others. There are approximately 10,000 state -regulated "high-hazard" potential dams in the U.S. "High-hazard" is a term used by a majority of state dam safety programs and federal agencies as part of a three-pronged classification system used to determine how hazardous a dam's failure might be to the downstream area.

While the definition varies from place to place, it generally means if failure of a high-hazard dam occurs, there probably will be loss of life. It must be emphasized that this determination does not mean that these dams are in need of repair--these dams could be in excellent condition or they could be in poor condition. "High-hazard" just reflects the dam's potential for doing damage downstream should it fail.

High-hazard potential dams exist in every state and affect the lives of thousands downstream. The current issue and debate is over the increasing number of these high-hazard structures--not because more high-hazard dams are being built, but that more development is occurring downstream. Dam safety regulators generally have no control over local zoning issues or developers' property rights. So this issue continues to worry regulators as the trend persists.

3. Lack of Financing for and Attention to Maintenance, Upgrade and Repair

Dams must be maintained to keep them safe. Occasional upgrade or rehabilitation is necessary due to deterioration, changing technical standards and improved techniques, better understanding of the area's precipitation conditions and increases in downstream populations and changing land use. When a dam's hazard classification is changed to reflect an increased hazard potential, the dam may need to be upgraded to meet an increased need for safety.

The lack of funding for dam upgrade has become a serious national problem, especially within the private sector. Unfortunately, operation, maintenance, and rehabilitation of dams can range in cost from the low thousands to millions. And owners are responsible for these expenses (58 % of dams in the U.S. are privately owned). Many

owners cannot afford these costs. Funding assistance, through government or private sources, is minimal at best. (Although, a handful of states offer loan programs.)

The lack of attention to dam maintenance and upgrade needs by owners can create a dangerous situation.

View an animation of a dam in need of rehab. (Mediaplayer)

In 2009, ASDSO concluded that it would take approximately $16 billion to rehabilitate the nation's most critical (high-hazard potential) dams that are in need of rehabilitation.

In 2009, the American Society of Civil Engineers updated its Infrastructure Report Card. In this report, dam safety was given a "D" partially due to the lack of funding available to support the repair and upgrade needs of the nation's dams.

4. Lack of Adequate Authority and Resources for State Dam Safety Programs

Although most states have legislative authority to carry out a comprehensive dam safety program, many are lacking in specific areas. Some states are unable, by specific language in their law, to regulate certain types of dams, allowing these structures to fall between the regulatory cracks. Other states have limited ability to enforce the law. In some states, officials have no recourse if dam owners do not carry out safety repairs ordered by the state.

Many states are simply under-resourced for carrying out the letter of the law. State budgets for dam safety range from $0 to $6.4 million. But the average annual state dam safety budget is about $454,000. The average number of regulated dams per state is approximately 2,000.

The average number of dam inspectors per state is less than eight; this means that each dam inspector is responsible for overseeing the safety of about 250 existing dams, plus the additional responsibilities of overseeing new construction.

The industry has determined that, in general, ten state regulators are necessary per 250 dams to do the best job possible in carrying out the regulatory mandate set out in most state dam safety laws. (Model State Dam Safety Program, Association of State Dam Safety Officials, 1998) This would mean that the average program regulating 1,500 dams would need about 60 professionals as opposed to six.

There is, therefore, a serious need, in almost every state, to pump additional state resources into these programs.

5. Lack of Emergency Preparedness In Case of Failure

Emergency preparedness is lacking. Only 55 percent of non-federally owned dams considered high hazard in the U.S. have emergency action plans. That means that most dam owners and local authorities are not prepared for a sudden dam failure and the ensuing downstream consequences.

6. Lack of Public Awareness

Intersecting almost all the issues above is the issue of public education about dams. The ordinary citizen is unaware that the beautiful lakes on which he or she boats, skis or fishes are only there because of manmade dams. Developers build in dambreak flood inundation areas knowing nothing about the potential that upstream dam has to cause devastation should it fail. In fact, some developers and zoning officials are completely unaware of dams within their community. Even if citizens understand and are aware of dams, they still can be overly confident in the infallibility of these manmade structures. Living in dambreak flood-prone areas is a risk.

Many dam owners do not realize their responsibility and liability toward the downstream public and environment. Adequate understanding of proper dam maintenance and upgrade techniques is a typical problem among many owners across the United States.

Some groups put forth the message that dams are bad for the environment and advocate their removal. This may mislead the public into thinking that taking care of our dams is a worthless cause. In some cases, dam removal is the best solution, but in all instances the consequences should be considered in coming to this decision.

Association of State Dam Safety Officials, 450 Old Vine St., Lexington, KY 40507 | 859/257-5140 | info@damsafety.org

www.michigan.gov
(To Print: use your browser's print function)
Release Date: June 05, 2009
Last Update: June 05, 2009
Contact: Robert McCann (517) 373-7917
Agency: Environmental Quality

DEQ Settles Claims Against UPPCO for Dam Failure Near Marquette

June 5, 2009

Department of Environmental Quality (DEQ) Director Steven E. Chester announced today that the department has entered into an agreement with Ishpeming-based Upper Peninsula Power Company (UPPCO), resolving the state of Michigan's claims for natural resource damages related to the May 2003 failure of UPPCO's dam on the Silver Lake Reservoir of the Dead River, approximately 30 miles upstream from the city of Marquette.

During the 2003 spring thaw, the Silver Lake Dam allowed the release of a tremendous amount of impounded water and sediment to downstream reaches of the Dead River and additional impoundments. The rush of water uprooted trees, toppled power lines, damaged bridges, and harmed aquatic life within the river.

Immediately following the event, DEQ staff began working with UPPCO representatives, in consultation with the Department of Natural Resources (DNR), to discuss a strategy for recovering lost resources and mitigating damage. Prior to entry of the Consent Judgment filed today with the Marquette County Circuit Court, UPPCO conducted extensive recovery activities within the Dead River and its impoundments, spending over $18 million to date, including rebuilding the dams on Silver Lake.

"This agreement will ensure that ongoing recovery activities will be completed, and the ecosystem in and around the river will be restored," said Director Chester. "I offer my thanks to our DEQ staff, our attorneys, and our partners in other agencies involved in responding to this environmental disaster."

The Consent Judgment requires that UPPCO complete remaining recovery activities and monitor completed work through implementation of a number of work plans appended to the agreement. In addition, a variety of mitigation activities will be completed by UPPCO to enhance existing natural resource functions and compensate for those damages where recovery is impossible, such as lost fishing days and other recreational uses of the river system. Projects to be completed by UPPCO include:

- Improved public access to Silver Lake;
- Vegetation management in Silver Lake during basin refill;
- 4.5 acres of new wetland with 12 additional acres restored;
- Connors and/or Mulligan Creek improvements;
- Habitat enhancement in lower half of Hoist Basin;
- Landowner education on fishery habitat in Hoist and McClure Basins;
- Efforts to reduce erosion downstream of County Road 550;
- A donation to the city of Marquette for development of boating access; and
- Habitat enhancement between County Road 550 and Lake Superior.

UPPCO has also agreed to fund mitigation activities to be conducted by the DEQ or DNR in the western Upper Peninsula including:

- $150,000 for fish stocking and maintenance activities in Silver Lake and the western Upper Peninsula;
- $200,000 toward development of a replacement coldwater fishery;
- $175,700 dedicated to freshwater mussel monitoring and research; and
- $50,000 for fish tissue monitoring in the refilled Silver Lake Reservoir.

A separate agreement entered between the DEQ and the Marquette Board of Light and Power (MBLP) governs recovery activities within the former Tourist Park Basin. The MBLP has also committed to rebuild a handicap-accessible fishing pier that was lost during the 2003 event.

Finally, UPPCO has agreed to reimburse the state for $325,000 in enforcement costs and will pay for future oversight

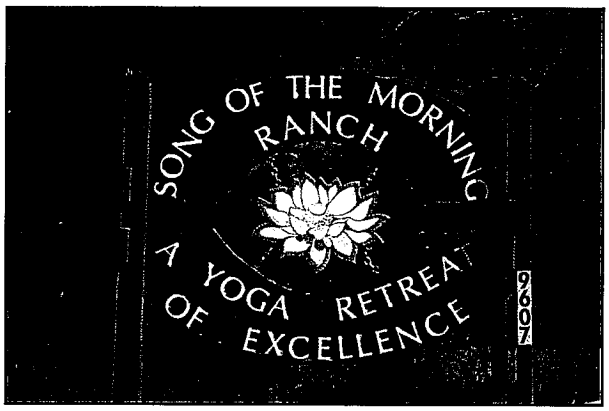
of remaining recovery and mitigation activities.

Editor's note: DEQ news releases are available on the department's Internet home page at www.michigan.gov/deq .

"Protecting Michigan's Environment, Ensuring Michigan's Future"

Michigan TU News: Trout Unlimited's Home River project hits home | Mlive.com article by Howard Meyerson

0 Like



In the last issue of Michigan Trout we highlighted the past history of dam failures on the Pigeon River, including the one that occurred this past summer. Since the past issue, the DNR and DEQ have continued to process the evidence and compile the case against the owner of the dam. The full case is expected to be complete by December. The State of Michigan, represented by Assistant Attorney General Pam Stevenson communicated with the owner of the dam, Golden Lotus Inc. by writing this summer. In this first written communication the State laid out the preferred elements of a settlement agreement. Early in the fall the State once again communicated to Golden Lotus via an in person meeting, reiterating the importance of removing the dam. In early October, Golden Lotus returned written response to the notices of violation from the State. In these letters, Golden Lotus expressed remorse for the incident occurring, a desire to do what is best for the Pigeon River, and intent to begin investigating removal of the dam.

Golden Lotus has since hired the assistance of an engineer and an environmental consultant to aid it in considering their options. Huron Pines, a non-advocacy conservation organization out of Grayling, has much technical expertise in stream restoration, and has also begun working with Golden Lotus to help it explore removal of the dam.

Trout Unlimited has been heavily involved in the progression of this case. As parties to the 1984 lawsuit regarding the last failure of this dam, we have legal stake in this failure. Peter Gustafson, a Grand Rapids attorney with the firm of Warner Norcross & Judd LLP, and a member and former Chair of the Pigeon River Advisory Council has been providing legal counsel to TU, pro bono. Michigan TU has been coordinating legal efforts with the State of Michigan. Meanwhile, we have also been involved with helping the owners explore and understand dam removal (through work with Huron Pines) and have meet on this issue directly with Golden Lotus. We are extremely encouraged by the Golden Lotus' interest in doing what's best for the Pigeon River. TU is fully committed to involvement in this issue and advocating for the best outcome for the river, including dam removal. We will continue to coordinate legally with the State of Michigan, while also continuing to provide technical information on dam removal whenever possible. Plan to see more updates on this issue in future issue of Michigan Trout magazine.

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June 1, 2011

Clinton River Watershed Council
1115 W. Avon Road
Rochester Hills, Michigan 48309

Attn: Anne M. Vaara, Executive Director

Re: Paint Creek Habitat Restoration Dam Removal
Dam Evaluation

HRC Job No. 20110115.07

Dear Ms. Vaara:

On Monday April 18, 2011 a visit was made to the site of the Paint Creek Dam. This structure is located in Section 28 of Oakland Township, West of Orion Road and South of Gunn Road. The purpose of the visit was to provide a general assessment on the condition of the dam. This assessment was limited to visual observations only. There are no known record documents of this structure and there is limited historical information available via personal accounts documented in local press articles and on-line historical accounts. This dam may be regulated by the Dam Safety Act. However, no reports were found suggesting compliance with the inspection and reporting sections of the Act. It is our understanding that the Dam, earthen embankment, and overflow are located on property owned by Oakland Township and therefore inspections in accordance with the Act is the Township's responsibility, if required.

Historical accounts of the dam and adjacent millrace head works structure indicate that original construction of these structures occurred in 1835 to provide water power to a grist mill located in Goodison. Local resident accounts indicated that the current dam was constructed in 1954. No written accounts have been found that describe the configuration, location or type of construction of the original dam structure. It is likely that the original dam may have been destroyed when the Rudd's Mill dam, near the Village of Lake Orion, failed in 1946 and sent a torrent of water down the Paint Creek.

In performing the assessment for this structure, the dam is categorized into five components which generally follow the Act guidelines. However, this report is not intended to be a Dam Safety Inspection. These components are defined as follows:

- Impoundment- This is the area of water that is retained by the dam upstream of the dam. For this structure the impoundment is the main channel of the creek and the adjacent flood plain for a distance upstream of the dam where the natural water surface elevation equals the water surface elevation at the upstream side of the dam spillway.
- Spillway- This is the structure that permits water to pass over the dam. For this structure the spillway extends across the main channel of the creek and consists of a concrete gravity dam with wooden weir plates at the crest of the spillway.

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www.hrc-engr.com

- Embankment- This is a containment structure usually consisting of an earthen berm used to create the impoundment area upstream of the dam and direct water to the spillway.
- Stilling Basin- This is the section of channel (creek) immediately downstream of the spillway where energy from the falling water is dissipated before entering the natural downstream creek channel.
- Control Structure- This is the mechanism by which water upstream of the dam can be regulated as needed for flood control or maintenance purposes. For this structure, the head works structure of the mill race, which consists of a concrete headwall with two hand operated sluice gates over twin culverts, serves this function.

Observations made during the site visit are as follows:

- Concrete observed at the sidewalls of the spillway does not display signs of excessive deterioration. Concrete making up the spillway is submerged and could not be observed.
- Weir plates consisting of wooden planks estimated to be 12 inches in height extend across the crest of the spillway.
- Sediment buildup was observed on the upstream side of the spillway.
- Vegetative debris has collected at the crest of the spillway.
- The stilling basin consists of the natural river bottom. Stream flow at the base of the spillway exhibits frothing and a white consistency immediately adjacent to the spillway. Energy dissipation is by natural cobble stones within the river bed.
- A steel mesh fence, located immediately downstream of the spillway, extends across the flood plain each side of the spillway. The fence on the north side of the spillway and immediately adjacent to the spillway is leaning to the west.
- The embankment side slopes on the both sides of the spillway is overgrown with trees and brush.
- The remains of the elevated embankment were observed on the north side of the spillway, however the area is overgrown and erosion has occurred in this area.
- Debris and steel rods obstruct the inlet to the head works structure of the mill race.
- Gates at the mill race head works structure are racked in the guide frames and are missing operator wheels. It is our understanding the local residents may operate the control structure.
- A tree and saplings are located immediately adjacent to the walls of the mill race head works structure.

Comments based on the observations made are as follows:

- Wood planks at the crest of the spillway are suspected to be an addition which was made after the original construction of the spillway to increase the water depth in the impoundment area. How these planks are fastened to the dam was not noticeable. These planks cause an increase in hydrostatic pressure on the upstream side of the dam and additional upstream flooding on private property. Further, downstream erosion is occurring due to the added fall height of water over the spillway. These boards should be removed as soon as flows permit unless verification the dam was constructed with the water and sediment loading capacity to accommodate the boards and scout protection of the foundation was considered.
- The spillway structure appears stable and does not exhibit any signs of rotation or sliding. However, per the previous comments, the additional erosion scour occurring may create a stability problem as no footing or foundation information is available.

- Lack of an elevated embankment on the north side of the spillway will allow flood waters to circumvent the spillway as evidenced by the erosion. This has compromised the embankment in this location and could create a dam stability issue if erosion continues to occur close to the spillway. The erosion should be properly repaired.
- The fence downstream and north of the spillway is located in the floodplain and has the potential catch debris during flood events. This can lead to trapped debris creating eddies and scour holes in the flood plain that can promote long term erosion of the earthen berm and should be removed.
- Brush and tree growth on the embankment should be removed. Extensive root systems can provide seepage paths for water. Downfallen trees can leave large holes in the embankment surface that will weaken the embankment and can lead to erosion. Brush obscures the surface and provides habitat for burrowing animals that lead to weakening of the embankment. The trees and vegetation should be removed.
- At the mill race inlet structure tree and brush growth immediately adjacent to concrete walls may eventually cause damage to the concrete and should be removed.
- Debris in front of the mill race head works and poorly maintained gates prevent the ability to regulate the water surface upstream of the dam. This is the only means by which this can be done. The control structure should be improved to work in conjunction with the dam spillway and controlled by the Township to manage flows thru the mill race.
- The condition of the mill race downstream of the head works structure to where it rejoins the creek has not been investigated. It is not known if it can adequately divert flow around the dam.

In conclusion, observations indicate that the dam and associate spillway are in fair condition. In order to properly maintain this structure, a number of improvements need to be made and a long term routine maintenance plan would need to be implemented by the dam owner, Oakland Township.

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.

Frederick Schreiber, P.E.
Structural Engineering Department Manager

James F. Burton, P.E.
Project Manager

pc: HBDS; G. Hopkins
HRC; K. McCormack, File

Q:\COMP\WATER1\DAM

NATIONAL DAM SAFETY PROGRAM ACT

Q:\COMP\WATER1\DAM

December 29, 2000

NATIONAL DAM SAFETY PROGRAM ACT

[As Amended Through P.L. 106–580, Dec. 29, 2000]

AN ACT To authorize the Secretary of the Army to undertake a national program of inspection of dams.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Dam Safety Program Act".

(33 U.S.C. 467 nt)

SEC. 2. DEFINITIONS.

In this Act, the following definitions apply:

(1) BOARD.—The term "Board" means a National Dam Safety Review Board established under section 8(h).

(2) DAM.—The term "dam"—

(A) means any artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water, that—

(i) is 25 feet or more in height from—

(I) the natural bed of the stream channel or watercourse measured at the downstream toe of the barrier; or

(II) if the barrier is not across a stream channel or watercourse, from the lowest elevation of the outside limit of the barrier;

to the maximum water storage elevation; or

(ii) has an impounding capacity for maximum storage elevation of 50 acre-feet or more; but

(B) does not include—

(i) a levee; or

(ii) a barrier described in subparagraph (A) that—

(I) is 6 feet or less in height regardless of storage capacity; or

(II) has a storage capacity at the maximum water storage elevation that is 15 acre-feet or less regardless of height;

unless the barrier, because of the location of the barrier or another physical characteristic of the barrier, is likely to pose a significant threat to human life or property if the barrier fails (as determined by the Director).

(3) DIRECTOR.—The term "Director" means the Director of FEMA.

(4) FEDERAL AGENCY.—The term "Federal agency" means a Federal agency that designs, finances, constructs, owns, operates, maintains, or regulates the construction, operation, or maintenance of a dam.

(5) FEDERAL GUIDELINES FOR DAM SAFETY.—The term "Federal Guidelines for Dam Safety" means the FEMA publication, numbered 93 and dated June 1979, that defines management practices for dam safety at all Federal agencies.

(6) FEMA.—The term "FEMA" means the Federal Emergency Management Agency.

(7) HAZARD REDUCTION.—The term "hazard reduction" means the reduction in the potential consequences to life and property of dam failure.

(8) ICODS.—The term "ICODS" means the Interagency Committee on Dam Safety established by section 7.

(9) PROGRAM.—The term "Program" means the national dam safety program established under section 8.

(10) STATE.—The term "State" means each of the several States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and any other territory or possession of the United States.

(11) STATE DAM SAFETY AGENCY.—The term "State dam safety agency" means a State agency that has regulatory authority over the safety of non-Federal dams.

(12) STATE DAM SAFETY PROGRAM.—The term "State dam safety program" means a State dam safety program approved and assisted under section 8(f).

(13) UNITED STATES.—The term "United States", when used in a geographical sense, means all of the States.

(33 U.S.C. 467)

SEC. 3. INSPECTION OF DAMS.

(a) IN GENERAL.—As soon as practicable, the Secretary of the Army, acting through the Chief of Engineers, shall carry out a national program of inspection of dams for the purpose of protecting human life and property. All dams in the United States shall be inspected by the Secretary except (1) dams under the jurisdiction of the Bureau of Reclamation, the Tennessee Valley Authority, or the International Boundary and Water Commission, (2) dams which have been constructed pursuant to licenses issued under the authority of the Federal Power Act, (3) dams which have been inspected within the twelve-month period immediately prior to the enactment of this Act by a State agency and which the Governor of such State requests be excluded from inspection, and (4) dams which the Secretary of the Army determines do not pose any threat to human life or property. The Secretary may inspect dams which have been licensed under the Federal Power Act upon request of the Federal Power Commission and dams under the jurisdiction of the International Boundary and Water Commission upon request of such Commission.

(b) STATE PARTICIPATION.—On request of a State dam safety agency, with respect to any dam the failure of which would affect the State, the head of a Federal agency shall—

(1) provide information to the State dam safety agency on the construction, operation, or maintenance of the dam; or

(2) allow any official of the State dam safety agency to participate in the Federal inspection of the dam.

(33 U.S.C. 467a)

SEC. 4. INVESTIGATION REPORTS TO GOVERNORS.

As soon as practicable after inspection of a dam, the Secretary shall notify the Governor of the State in which such dam is located the results of such investigation. In any case in which any hazardous conditions are found during an inspection, upon request by the owner, the Secretary, acting through the Chief of Engineers, may perform detailed engineering studies to determine the structural integrity of the dam, subject to reimbursement of such expense by the owner of such dam. The Secretary shall immediately notify the Governor of any hazardous conditions found during an inspection. The Secretary shall provide advice to the Governor, upon request, relating to timely remedial measures necessary to mitigate or obviate any hazardous conditions found during an inspection.

(33 U.S.C. 467b)

SEC. 5. DETERMINATION OF DANGER TO HUMAN LIFE AND PROPERTY.

For the purpose of determining whether a dam (including the waters impounded by such dam) constitutes a danger to human life or property, the Secretary shall take into consideration the possibility that the dam might be endangered by overtopping, seepage, settlement, erosion, sediment, cracking, earth movement, earthquakes, failure of bulkheads, flashboard, gates on conduits, or other conditions which exist or which might occur in any area in the vicinity of the dam.

(33 U.S.C. 467c)

SEC. 6. NATIONAL DAM INVENTORY.

The Secretary of the Army, acting through the Chief of Engineers, may maintain and periodically publish updated information on the inventory of dams in the United States.

(33 U.S.C. 467d)

SEC. 7. INTERAGENCY COMMITTEE ON DAM SAFETY.

(a) ESTABLISHMENT.—There is established an Interagency Committee on Dam Safety—

(1) comprised of a representative of each of the Department of Agriculture, the Department of Defense, the Department of Energy, the Department of the Interior, the Department of Labor, FEMA, the Federal Energy Regulatory Commission, the Nuclear Regulatory Commission, the Tennessee Valley Authority, and the United States Section of the International Boundary Commission; and

(2) chaired by the Director.

(b) DUTIES.—ICODS shall encourage the establishment and maintenance of effective Federal and State programs, policies, and guidelines intended to enhance dam safety for the protection of human life and property through—

(1) coordination and information exchange among Federal agencies and State dam safety agencies; and

(2) coordination and information exchange among Federal agencies concerning implementation of the Federal Guidelines for Dam Safety.

(33 U.S.C. 467e)

SEC. 8. NATIONAL DAM SAFETY PROGRAM.

(a) IN GENERAL.—The Director, in consultation with ICODS and State dam safety agencies, and the Board shall establish and maintain, in accordance with this section, a coordinated national dam safety program. The Program shall—

(1) be administered by FEMA to achieve the objectives set forth in subsection (c);

(2) involve, to the extent appropriate, each Federal agency; and

(3) include—

(A) each of the components described in subsection (d);

(B) the implementation plan described in subsection (e); and

(C) assistance for State dam safety programs described in subsection (f).

(b) DUTIES.—The Director shall—

(1) not later than 270 days after the date of the enactment of this paragraph, develop the implementation plan described in subsection (e);

(2) not later than 300 days after the date of the enactment of this paragraph, submit to the appropriate authorizing committees of Congress the implementation plan described in subsection (e); and

(3) by regulation, not later than 360 days after the date of the enactment of this paragraph—

(A) develop and implement the Program;

(B) establish goals, priorities, and target dates for implementation of the Program; and

(C) to the extent feasible, provide a method for cooperation and coordination with, and assistance to, interested governmental entities in all States.

(c) OBJECTIVES.—The objectives of the Program are to—

(1) ensure that new and existing dams are safe through the development of technologically and economically feasible programs and procedures for national dam safety hazard reduction;

(2) encourage acceptable engineering policies and procedures to be used for dam site investigation, design, construction, operation and maintenance, and emergency preparedness;

(3) encourage the establishment and implementation of effective dam safety programs in each State based on State standards;

(4) develop and encourage public awareness projects to increase public acceptance and support of State dam safety programs;

(5) develop technical assistance materials for Federal and non-Federal dam safety programs; and

(6) develop mechanisms with which to provide Federal technical assistance for dam safety to the non-Federal sector.

(d) COMPONENTS.—

(1) IN GENERAL.—The Program shall consist of—

(A) a Federal element and a non-Federal element; and

(B) leadership activity, technical assistance activity, and public awareness activity.

(2) ELEMENTS.—

(A) FEDERAL.—The Federal element shall incorporate the activities and practices carried out by Federal agencies under section 7 to implement the Federal Guidelines for Dam Safety.

(B) NON-FEDERAL.—The non-Federal element shall consist of—

(i) the activities and practices carried out by States, local governments, and the private sector to safely build, regulate, operate, and maintain dams; and

(ii) Federal activities that foster State efforts to develop and implement effective programs for the safety of dams.

(3) FUNCTIONAL ACTIVITIES.—

(A) LEADERSHIP.—The leadership activity shall be the responsibility of FEMA and shall be exercised by chairing ICODS to coordinate Federal efforts in cooperation with State dam safety officials.

(B) TECHNICAL ASSISTANCE.—The technical assistance activity shall consist of the transfer of knowledge and technical information among the Federal and non-Federal elements described in paragraph (2).

(C) PUBLIC AWARENESS.—The public awareness activity shall provide for the education of the public, including State and local officials, in the hazards of dam failure, methods of reducing the adverse consequences of dam failure, and related matters.

(e) IMPLEMENTATION PLAN.—The Director shall—

(1) develop an implementation plan for the Program that shall set, through fiscal year 2002, year-by-year targets that demonstrate improvements in dam safety; and

(2) recommend appropriate roles for Federal agencies and for State and local units of government, individuals, and private organizations in carrying out the implementation plan.

(f) ASSISTANCE FOR STATE DAM SAFETY PROGRAMS.—

(1) IN GENERAL.—To encourage the establishment and maintenance of effective State programs intended to ensure dam safety, to protect human life and property, and to improve State dam safety programs, the Director shall provide assistance with amounts made available under section 12 to assist States in establishing and maintaining dam safety programs—

(A) in accordance with the criteria specified in paragraph (2); and

(B) in accordance with more advanced requirements and standards established by the Board and the Director with the assistance of established criteria such as the Model State Dam Safety Program published by FEMA, numbered 123 and dated April 1987, and amendments to the Model State Dam Safety Program.

(2) CRITERIA AND BUDGETING REQUIREMENT.—For a State to be eligible for primary assistance under this subsection, a State dam safety program must be working toward meeting the following criteria and budgeting requirement, and for a State to be eligible for advanced assistance under this subsection, a State dam safety program must meet the following criteria and budgeting requirement and be working toward meeting the advanced requirements and standards established under paragraph (1)(B):

(A) CRITERIA.—For a State to be eligible for assistance under this subsection, a State dam safety program must be authorized by State legislation to include substantially, at a minimum—

(i) the authority to review and approve plans and specifications to construct, enlarge, modify, remove, and abandon dams;

(ii) the authority to perform periodic inspections during dam construction to ensure compliance with approved plans and specifications;

(iii) a requirement that, on completion of dam construction, State approval must be given before operation of the dam;

(iv)(I) the authority to require or perform the inspection, at least once every 5 years, of all dams and reservoirs that would pose a significant threat to human life and property in case of failure to determine the continued safety of the dams and reservoirs; and

(II) a procedure for more detailed and frequent safety inspections;

(v) a requirement that all inspections be performed under the supervision of a State-registered professional engineer with related experience in dam design and construction;

(vi) the authority to issue notices, when appropriate, to require owners of dams to perform necessary maintenance or remedial work, revise operating procedures, or take other actions, including breaching dams when necessary;

(vii) regulations for carrying out the legislation of the State described in this subparagraph;

(viii) provision for necessary funds—

(I) to ensure timely repairs or other changes to, or removal of, a dam in order to protect human life and property; and

(II) if the owner of the dam does not take action described in subclause (I), to take appropriate action as expeditiously as practicable;

(ix) a system of emergency procedures to be used if a dam fails or if the failure of a dam is imminent; and

(x) an identification of—

(I) each dam the failure of which could be reasonably expected to endanger human life;

(II) the maximum area that could be flooded if the dam failed; and

(III) necessary public facilities that would be affected by the flooding.

(B) BUDGETING REQUIREMENT.—For a State to be eligible for assistance under this subsection, State appropriations must be budgeted to carry out the legislation of the State under subparagraph (A).

(3) WORK PLANS.—The Director shall enter into a contract with each State receiving assistance under paragraph (2) to develop a work plan necessary for the State dam safety program to reach a level of program performance specified in the contract.

(4) MAINTENANCE OF EFFORT.—Assistance may not be provided to a State under this subsection for a fiscal year unless the State enters into such agreement with the Director as the Director requires to ensure that the State will maintain the aggregate expenditures of the State from all other sources for programs to ensure dam safety for the protection of human life and property at or above a level equal to the average annual level of such expenditures for the 2 fiscal years preceding the fiscal year.

(5) APPROVAL OF PROGRAMS.—

(A) SUBMISSION.—For a State to be eligible for assistance under this subsection, a plan for a State dam safety program shall be submitted to the Director for approval.

(B) APPROVAL.—A State dam safety program shall be deemed to be approved 120 days after the date of receipt by the Director unless the Director determines within the 120-day period that the State dam safety program fails to meet the requirements of paragraphs (1) through (3).

(C) NOTIFICATION OF DISAPPROVAL.—If the Director determines that a State dam safety program does not meet the requirements for approval, the Director shall immediately notify the State in writing and provide the reasons for the determination and the changes that are necessary for the plan to be approved.

(6) REVIEW OF STATE DAM SAFETY PROGRAMS.—Using the expertise of the Board, the Director shall periodically review State dam safety programs. If the Board finds that a State dam safety program has proven inadequate to reasonably protect human life and property and the Director concurs, the Director shall revoke approval of the State dam safety program, and withhold assistance under this subsection, until the State

dam safety program again meets the requirements for approval.

(g) DAM SAFETY TRAINING.—At the request of any State that has or intends to develop a State dam safety program, the Director shall provide training for State dam safety staff and inspectors.

(h) BOARD.—

(1) ESTABLISHMENT.—The Director may establish an advisory board to be known as the "National Dam Safety Review Board" to monitor State implementation of this section.

(2) AUTHORITY.—The Board may use the expertise of Federal agencies and enter into contracts for necessary studies to carry out this section.

(3) MEMBERSHIP.—The Board shall consist of 11 members selected by the Director for expertise in dam safety, of whom—

(A) 1 member shall represent the Department of Agriculture;

(B) 1 member shall represent the Department of Defense;

(C) 1 member shall represent the Department of the Interior;

(D) 1 member shall represent FEMA;

(E) 1 member shall represent the Federal Energy Regulatory Commission;

(F) 5 members shall be selected by the Director from among dam safety officials of States; and

(G) 1 member shall be selected by the Director to represent the United States Committee on Large Dams.

(4) COMPENSATION OF MEMBERS.—

(A) FEDERAL EMPLOYEES.—Each member of the Board who is an officer or employee of the United States shall serve without compensation in addition to compensation received for the services of the member as an officer or employee of the United States.

(B) OTHER MEMBERS.—Each member of the Board who is not an officer or employee of the United States shall serve without compensation.

(5) TRAVEL EXPENSES.—Each member of the Board shall be allowed travel expenses, including per diem in lieu of subsistence, at rates authorized for an employee of an agency under subchapter I of chapter 57 of title 5, United States Code, while away from the home or regular place of business of the member in the performance of services for the Board.

(6) APPLICABILITY OF FEDERAL ADVISORY COMMITTEE ACT.—The Federal Advisory Committee Act (5 U.S.C. App.) shall not apply to the Board.

(33 U.S.C. 467f)

SEC. 9. RESEARCH.

(a) IN GENERAL.—The Director, in cooperation with ICODS, shall carry out a program of technical and archival research to develop—

(1) improved techniques, historical experience, and equipment for rapid and effective dam construction, rehabilitation, and inspection; and

(2) devices for the continued monitoring of the safety of dams.

(b) CONSULTATION.—The Director shall provide for State participation in research under subsection (a) and periodically advise all States and Congress of the results of the research.

(33 U.S.C. 467g)

SEC. 10. REPORTS.

(a) REPORT ON DAM INSURANCE.—Not later than 180 days after the date of the enactment of this subsection, the Director shall report to Congress on the availability of dam insurance and make recommendations concerning encouraging greater availability.

(b) BIENNIAL REPORTS.—Not later than 90 days after the end of each odd-numbered fiscal year, the Director shall submit a report to Congress that—

(1) describes the status of the Program;

(2) describes the progress achieved by Federal agencies during the 2 preceding fiscal years in implementing the Federal Guidelines for Dam Safety;

(3) describes the progress achieved in dam safety by States participating in the Program; and

(4) includes any recommendations for legislative and other action that the Director considers necessary.

(33 U.S.C. 467h)

SEC. 11. STATUTORY CONSTRUCTION.

Nothing in this Act and no action or failure to act under this Act shall—

(1) create any liability in the United States or its officers or employees for the recovery of damages caused by such action or failure to act;

(2) relieve an owner or operator of a dam of the legal duties, obligations, or liabilities incident to the ownership or operation of the dam; or

(3) preempt any other Federal or State law.

(33 U.S.C. 467i)

SEC. 12. AUTHORIZATION OF APPROPRIATIONS.

(a) NATIONAL DAM SAFETY PROGRAM.—

(1) ANNUAL AMOUNTS.—There are authorized to be appropriated to FEMA to carry out sections 7, 8, and 10 (in addition to any amounts made available for similar purposes included in any other Act and amounts made available under subsections (b) through (e)), $1,000,000 for fiscal year 1998, $2,000,000 for fiscal year 1999, $4,000,000 for fiscal year 2000, $4,000,000 for fiscal year 2001, and $4,000,000 for fiscal year 2002.

(2) ALLOCATION.—

(A) IN GENERAL.—Subject to subparagraphs (B) and (C), for each fiscal year, amounts made available under this subsection to carry out section 8 shall be allocated among the States as follows:

(i) One-third among States that qualify for assistance under section 8(f).

(ii) Two-thirds among States that qualify for assistance under section 8(f), to each such State in proportion to—

(I) the number of dams in the State that are listed as State-regulated dams on the inventory of dams maintained under section 6; as compared to

(II) the number of dams in all States that are listed as State-regulated dams on the inventory of dams maintained under section 6.

(B) MAXIMUM AMOUNT OF ALLOCATION.—The amount of funds allocated to a State under this paragraph may not exceed 50 percent of the reasonable cost of implementing the State dam safety program.

(C) DETERMINATION.—The Director and the Board shall determine the amount allocated to States needing primary assistance and States needing advanced assistance under section 8(f).

(b) NATIONAL DAM INVENTORY.—There is authorized to be appropriated to carry out section 6 $500,000 for each fiscal year.

(c) DAM SAFETY TRAINING.—There is authorized to be appropriated to carry out section 8(g) $500,000 for each of fiscal years 1998 through 2002.

(d) RESEARCH.—There is authorized to be appropriated to carry out section 9 $1,000,000 for each of fiscal years 1998 through 2002.

(e) STAFF.—There is authorized to be appropriated to FEMA for the employment of such additional staff personnel as are necessary to carry out sections 6 through 9 $400,000 for each of fiscal years 1998 through 2002.

(f) LIMITATION ON USE OF AMOUNTS.—Amounts made available under this Act may not be used to construct or repair any Federal or non-Federal dam.

(33 U.S.C. 467j)

MICHIGAN DAM SAFETY LAWS AND REGULATIONS

Citation

Laws regarding Michigan dam safety are found in Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Rules have been promulgated.

History

The Dam Construction Approval Act, Public Act 184 of 1963, was the first statute requiring permits from the state for the construction of dams. Permits were required for the construction of new dams which exceeded 5 feet or more of head or which impounded more than 5 acres. The Department of Natural Resources had the authority to order the repair or removal of unsafe dams and require the owner to provide a engineering report on the condition of dams found to be in a hazardous condition. It did not require periodic dam safety inspection by a professional, nor were permits required for repair or alteration of existing dams.

Based upon the shortcomings in the Dam Construction Approval Act, a new dam safety statute was drafted in the 1980s. The "Great Flood" of September 1986 which caused the failure of 14 dams provided additional impetus for the passage of the Dam Safety Act, PA 300 of 1989. The Dam Safety Act was recodified as Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act, 1994 PA 451, in 1994.

Definitions/Dam Classifications

Dam means an artificial barrier, including dikes, embankments, and appurtenant works, that impounds, diverts, or is designed to impound or divert water, or water and any other liquid or material in the water, and that is or will, when complete, be 6 feet or more in height, and has or will have an impounding capacity at design flood elevation of 5 surface acres or more.

Dam height means the difference in elevation measured vertically between the natural bed of a stream or watercourse at the downstream toe of the dam, or, if it is not across a stream channel or watercourse, from the lowest elevation of the downstream toe of the dam to the design flood elevation or to the lowest point of the top of the dam, whichever is less. (Sec. 31503 [10])

Hazard Classification

High Hazard Potential: Failure may cause serious damage to inhabited homes, agricultural buildings, campgrounds, recreational facilities, industrial or commercial buildings, public utilities, main highways or class I carrier railroads, or where environmental degradation would be significant, or where danger to individuals exists with the potential for loss of life. (Sec.31503 [11])

Significant Hazard Potential: failure may cause damage limited to isolated inhabited homes, agricultural buildings, structures, secondary highways, short line railroads, or public utilities, where environmental degradation may be significant, or where and danger to individuals exists. (Sec. 31505 [5])

Low Hazard Potential: failure may cause damage limited to agriculture, uninhabited buildings, township or county roads, where environmental degradation would be minimal, and danger to individuals is slight or nonexistent. (Sec. 31504 [2])

Design Criteria

Hydrologic (Sec. 31526):

High hazard potential dams, less than 40 feet in height, as measured from the 200-year design flood elevation to the lowest downstream toe elevation, shall be capable of passing the 200-year flood, or the flood of record, whichever is greater.

High hazard potential dams, 40 feet or greater in height, as measured from the 200-year design flood elevation to the lowest downstream toe elevation, shall be capable of passing the half probable maximum flood. The half probable maximum flood criterion may be reduced to not less than the 200-year flood, with proper documentation evidencing a failure of a dam under half probable maximum flood conditions will not cause additional flood damage or loss of life.

Significant hazard potential dams shall be capable of passing the 200-year flood, or the flood of record, whichever is greater

Low hazard potential dams shall be capable of passing the 100-year flood, or the flood of record, whichever is greater.

Seismic: Not specifically discussed in statute or rules.

Jurisdiction/Powers of Department

The Department of Environmental Quality is responsible for the safety of dams in Michigan. The department has the power to regulate the construction, reconstruction, repair, alteration, removal, abandonment, and operation of dams; to provide for the inspection of dams; to provide for the protection of natural resources and the public trust; and to prescribe remedies and penalties. (Part 315, 1994 PA 451) The department may in an emergency take any necessary actions, including repair, drawdown, breaching or cessation of operation to protect public safety, natural resources and the public trust. Department personnel have conditional right of entry to a dam site. (Sec. 31527) The department may limit dam operation or order dam removal in order to protect public health, safety, welfare, natural resources and the public trust.

Permit/Approval Process

A person shall not construct, enlarge, repair, reconstruct, alter, remove, or abandon any dam without first applying to the department for a permit and providing information that the department determines necessary for the issuance of a permit. Applications shall be accompanied by appropriate fees according to the following schedule: (Sec. 31509 [3] [4])

New construction, reconstruction, and enlargement projects:

Height > 6 feet but < 10 feet	$500
Height > 10 feet but < 20 feet	$1000

Height >20 feet	$3000

Repair, alteration, removal and abandonment projects:

Major Projects	$200
Minor Projects	$100

A licensed professional engineer shall prepare all plans and specifications, except for minor projects. (Sec. 31508[1]) Upon receipt of an application for a permit, the department shall accept or reject the permit within 60 days, or 120 days if a public hearing is held (Sec 31512). Required spillway design criteria are found in Sec. 31516.

After construction of a permitted dam and a statement from the project engineer advising that the dam was built in conformance with approved plans and specifications, the department shall inspect and file written notice of approval for the dam. (Sec. 31517)

Fees: See *Permit/Approval Process* above

Inspection Process

An owner shall submit to the department inspection reports that are prepared by a licensed professional engineer which evaluate the condition of the dam. The inspection reports shall be submitted as follows:

- Once every 3 years for high hazard potential dams
- Once every 4 years for significant hazard potential dams
- Once every 5 years for low hazard potential dams

The department shall establish an inspection schedule and notify all owners in writing when inspection reports are due. Instead of engaging a professional engineer, a local unit of government that owns a dam may request the department to do a visual inspection of the dam and prepare a report.

Frequency of Inspections

Hazard Classification	Inspection Cycle
High	**Every 3 years**
Significant	**Every 4 years**
Low	**Every 5 years**

Owner Non-Compliance/Violations/Penalties

The Dam Safety Act provides remedies and penalties, both criminal and civil, for violations of the act, permit conditions, and department orders. (Sec. 31524 and 31525) Included in these remedies is authorization to the department to cause an inspection report to be prepared and to recover costs in a civil court in the event that a dam owner refuses to submit an inspection report as required by the Dam Safety Act. (Sec. 31518 [6])

Emergencies

Owners of high and significant hazard potential dams are required to have an emergency action plan submitted to the department and to the local emergency services

coordinator. (Sec. 31523) Dam owners are required to notify the department of emergencies at the owner's dam.

The director may order an owner to immediately repair, draw down, breach, or cease operation of a dam where a dam is in imminent danger of failure and is threatening the public health, safety, welfare, property, natural resources or public trust. (Sec. 31521)

Liability

This act shall not be construed to relieve an owner of any legal duty, obligation, or liability incident to the ownership or operation of a dam or impoundment. (Sec. 31529) A state Supreme Court ruling provides a level of liability to state employees.

Oversight

Any person aggrieved by any action or inaction may request a hearing of the matters involved. The hearing shall be conducted by the department in accordance with the Administrative Procedures Act of 1969. (Sec. 31526)

Miscellaneous

The Dam Safety Act also authorized enforcement of inspection report recommendations, exempts dams under Federal jurisdiction, and requires promulgation of administrative rules, including rules to establish minor project categories.

State Citations

	STATUTE	REGULATIONS
Original	The Dam Construction Approval Act, Act 184 of 1963 The Dam Safety Act, Act 300 of 1989	Administrative Rules for Dam Safety, 1993
Last Amended	Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.	

State Web Site: http://www.michigan.gov/deqdamsafety

DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND AND WATER MANAGEMENT

DAM SAFETY

(By authority conferred on the department of natural resources by section 57 of Act No. 300 of the Public Acts of 1989, being S281.1357 of the Michigan Compiled Laws)

R 281.1301 Definitions.

Rule 1. (1) As used in these rules, "Act" means Act No. 300 of the Public Acts of 1989, being S281.1301 et seq. of the Michigan Compiled Laws.

(2) Terms defined in the act have the same meanings when used in these rules.

History: 1993 AACS.

R 281.1302 Permit applications and procedures.

Rule 2. (1) An application for a permit for a proposed project shall be made on a form that is prescribed and provided by the department. The application form shall be the same form that is used for other department-administered statutes that require permits at the land-water interface. Application forms may be obtained from the land and water management division or from any district or regional office of the department.

(2) An application fee for a permit to repair, alter, remove, or abandon a dam shall be submitted with the application form. Submission of an application fee for a permit to construct, reconstruct, or enlarge a dam may be deferred until plans and specifications are submitted. The fee for enlargement of a dam that is part of a mine tailings basin system shall be based on the height of the new embankment section as measured by the vertical distance from the lowest point of the embankment crest to the lowest tailings foundation elevation. The fee shall be paid by check, money order, or draft made payable to: "State of Michigan".

(3) When the proposed project includes related multiple impoundments, an applicant may apply for a single permit, but an appropriate fee shall be required for each impoundment.

(4) An application for a permit to construct a new dam, enlarge an existing dam, or reconstruct a failed dam shall be reviewed by the department in a 2-step process. The first step shall be a review of the conceptual plans to determine if the proposed project may have a significant adverse effect on public health, safety, welfare, property, or natural resources or the public trust in those natural resources. The second step shall be the review of plans and specifications to determine if the engineering design is acceptable.

(5) An application for a permit to construct a new dam, enlarge an existing dam, or reconstruct a failed dam shall include all of the following:

(a) A description and evaluation of the loss of natural resources that are associated with the project.

(b) A description of the natural resources that are associated with or created by the impoundment and how they offset the natural resources lost by the creation of the impoundment.

(c) The project assessment required pursuant to the provisions of R 281.1304. However, an assessment is not required for a permit to enlarge an existing dam when the purpose of the impoundment will remain the same as the original impoundment and the surface area of the impoundment will be increased by 10% or less.

(d) Conceptual plans that are adequate to evaluate the project's impacts on public health, safety, welfare, property, or natural resources or the public trust in those natural resources. Conceptual plans shall include, at a minimum, all of the following:

(i) A site plan that shows all of the following:
(A) The location of the dam.
(B) The existing stream channel.
(C) The normal shoreline of the proposed impoundment.
(D) Property lines.
(E) Dimensions or proper scale.
(ii) Transverse and longitudinal cross-sections through the dam that show all of the following:
(A) The spillway or spillways.
(B) Upstream and downstream water levels.
(C) The stream channel bottom.
(iii) The location of all occupied dwellings within 1/4 of a mile of the proposed impoundment if the dam is new or if the impoundment elevation is changed. Projects that do not propose an impoundment elevation change are excluded from this requirement.
(iv) Ingress and egress routes for construction activities.
(6) The first step of the review shall commence once the department has received all of the following:
(a) The application form with all necessary information filled in.
(b) All additional information requested by the department that is required to evaluate the proposed activity's effects on the public health, safety, welfare, property, or natural resources or the public trust in those natural resources. Requests by the department for additional information shall be made in writing.
(c) All appropriate application fees, except as noted in subrule (2) of this rule.
(d) The assessment described in R 281.1304 when required pursuant to the provisions of subrules (5) and (7) of this rule.
(e) Conceptual plans for the project as described in this subrule and subrules (5), (7),and (8) of this rule.
Engineering plans and specifications are not required for the department to complete the first step of the review.
(7) An application for a permit to abandon or remove a dam shall include all of the following:
(a) A site plan that shows all of the following:
(i) The location of the dam.
(ii) The impoundment.
(iii) The existing stream channel.
(iv) The proposed location of the stream channel.
(b) A description of the method to be employed in removing or abandoning the dam.
(c) An evaluation of the capacity of the remaining structure to pass flood flows after the proposed work is completed, including hydraulic computations to support the evaluation.
(d) An evaluation of the quantity and quality characteristics of the sediments that have accumulated in the dam impoundment.
(e) A description of the methods to be employed to control sediments during and after removing or abandoning the dam.
(f) The project assessment required pursuant to the provisions of R 281.1304.
(8) An application for a permit to repair or alter a dam shall include both of the following:
(a) A description of the proposed work, including the volumes of materials to be dredged or filled.
(b) Engineering plans and specifications for the proposed work.
(9) After receipt of an application, the department may request, in writing, from the applicant, such additional information, assessment, design calculations, records, or documents as are determined to be necessary to evaluate the proposed project.
(10) Based in part on the information provided by the applicant and in part on comments received by the department during the 20-day comment period as provided by section 23 of the act, the department shall conduct the first step of the review to determine the effects of the proposed project on public health, safety, welfare, property, or natural resources or the public trust in those natural resources and riparian rights. The department shall make 1 of the following determinations:
(a) The proposed activity is permitable as submitted.
(b) The proposed activity is permitable if certain described modifications are made.
(c) The proposed activity is not permitable and cannot be modified to result in the granting of a permit.
(11) An application for a permit shall not be considered complete until the assessment required in R 281.1304 has been completed and the department has received all of the following:
(a) All information that is requested on the application form.

(b) Any other information that is required by written notice from the department.

(c) The application fee, unless the fee is deferrable pursuant to the provisions of subrule (2) of this rule.

(d) Acceptable conceptual plans and specifications.

The department shall grant or deny a permit within 60 days after the submission of a complete application or within 120 days after the submission of a complete application if a public hearing is held.

(12) An application shall be considered to be withdrawn and the file for the application shall be closed if an applicant fails to respond to any written inquiry or request from the department within 30 days of the request. If the applicant cannot provide the specific information that the department requests within the 30-day period, the applicant may keep the application open by advising the department, in writing, within the 30-day period, of when the information can be submitted. The applicant's proposed deadline shall be reasonable. If the information is not provided by the applicant's deadline, the application shall then be closed.

(13) The department shall advise an applicant of its determination. If an activity is permitable as submitted or is permitable if modified, the department shall then review engineering plans and specifications. If the department has not yet received required application fees or engineering plans and specifications, the department shall request the fees or plans and specifications at the time an applicant is advised of the department's determination.

(14) When the department determines that engineering plans and specifications are acceptable, a permit shall be issued or, if a permit has already been issued, the applicant shall be notified, in writing, that plans and specifications are acceptable and the project may commence. If the engineering plans and specifications are determined to be unacceptable, the department shall advise the applicant of why the plans and specifications are unacceptable and provide a concise written statement explaining how the plans and specifications may be corrected.

History: 1993 AACS.

R 281.1303 Permit conditions.

Rule 3. (1) A permit shall provide that the work authorized by the permit shall be completed within a specified time period, which shall not be more than 2 years after the date that the permit is issued. Extensions of time of up to 2 years each may be granted by the department for good cause shown by the applicant. An administrative fee shall not be required for an application for extensions of time.

(2) A permit does not obviate the necessity of receiving approval from the United States army corps of engineers, when applicable, the state department of public health, or a local unit of government, when applicable, including a local unit of government that is responsible for administering the provisions of Act No. 245 of the Public Acts of 1970, as amended, being S281.631 et seq. of the Michigan Compiled Laws, and Act No. 347 of the Public Acts of 1972, as amended, being S282.101 et seq. of the Michigan Compiled Laws.

(3) The department shall not issue a permit, except for a permit pursuant to the provisions of section 25(2) of the act or a permit under a minor project category, until 20 days after the mailing of the list to each eligible subscriber as provided for in sections 21(1) to (3) and 23(1) of the act.

(4) Upon request, the department shall provide any person with a copy of a permit application and supporting documents pursuant to the provisions of Act No. 442 of the Public Acts of 1976, as amended, being S15.231 et seq. of the Michigan Compiled Laws.

(5) If the mitigation proposed in a mitigation plan that is submitted by an applicant is approved by the department, the department may incorporate the mitigation actions as permit conditions for the improvement of the existing resources or the creation of a new resource to offset resource losses that result from the proposed project.

(6) A temporary emergency action plan may be required by permit condition which would be effective during, and applicable to, the construction period.

History: 1993 AACS.

R 281.1304 Project assessment.

Rule 4. (1) In each application for a permit as required pursuant to the provisions of R 281.1302, (5) and (7), an assessment of all known existing

and potential adverse effects within the scope of the project shall be provided by the applicant and reviewed by the department to determine whether the project will have a significant adverse effect on public health, safety, welfare, property, or natural resources or the public trust in those resources. This assessment shall include evaluations of both positive and negative impacts of the project commensurate with the scope of the project and mitigating measures to minimize impacts on all of the following:

(a) Wetlands.
(b) Fisheries.
(c) Wildlife.
(d) Threatened and endangered species.
(e) Water quality.
(f) Streamflows.
(g) Sediment transport.
(h) Turbidity.
(i) Water chemistry.
(j) Water temperature.
(k) Riparian rights.

The assessment shall include impacts of the impoundment on the stream below the impoundment and shall address impacts both during construction and after completion of the project.

(2) If the department determines that more detailed study is needed, it may require the applicant to provide the additional information or cause such a study to be made. The department shall state, with specificity, in writing, the requirements or criteria for such additional information or study. All available data shall be evaluated by the department in its review of an application for a permit.

History: 1993 AACS.

R 281.1305 Engineering plans and specifications.

Rule 5. (1) Engineering plans and specifications for the construction of new dams, the reconstruction of failed dams, or the enlargement of dams shall be prepared by a licensed professional engineer, be submitted to the department, be approved by the department before the commencement of construction, and include, at a minimum, all of the following:

(a) A map that shows the location of the project and a topographic map of the dam site and impoundment area. Mapping shall show all of the following:

(i) Maximum flood storage elevations of the impoundment.
(ii) Property boundaries of the site, including flowage easements.
(iii) Borrow area or areas.
(iv) Ingress and egress routes.
(v) Work limits.

(b) Detailed design plans that show all of the following:

(i) A profile along the centerline of the embankment and the spillway or spillways.

(ii) Cross-sections of the dam at representative locations that show suitable detail of the upstream and downstream slopes and crest.

(iii) The findings of investigations and analyses of embankment and foundation materials, including the locations of soil borings, soil boring logs, and proposed foundation treatment.

(iv) Other drawings that are necessary to fully depict the project as determined by the department upon consultation with the applicant.

(v) Other analyses that are necessary to document the adequacy of the design of the structure and protection of natural resources, public safety, and public trust as determined by the department upon consultation with the applicant.

(c) An operation plan that describes how the streamflows will be maintained under various conditions.

(d) Technical specifications related to the scope of work for the dam and appurtenant structures. Specifications shall reference nationally recognized and acceptable engineering specifications.

(2) Engineering plans and specifications for the repair, alteration, removal, or abandonment of a dam, with the exception of minor alteration or repair projects, shall be prepared by a licensed professional engineer, be submitted to the department, and be approved by the department before commencement of construction. Plans and specifications for repair and alteration shall include sufficient detail and analyses for the department to determine whether the proposed activity adequately protects the structural integrity of the dam. Plans and specifications for removal and abandonment of a dam shall include sufficient detail and analyses for the department to determine whether the proposed activity adequately protects

natural resources, public safety, and the public trust.

(3) The hazard potential classification and spillway design flood determination of a dam site shall be determined by the department. The department may require the applicant to provide additional information for the department's use in these determinations. Spillway capacity requirements are fulfilled if the specified design flood is stored in the impoundment, attenuated in the impoundment system, or passed through the spillway.

(4) When mitigation for the loss of natural resources is required for a proposed activity, plans and specifications for the mitigation may be required.

History: 1993 AACS.

R 281.1306 Minor project categories.

Rule 6. (1) The department shall grant or deny an application for a minor project after all of the following steps have been completed:

(a) Submission of a complete application.

(b) An on-site inspection by a department representative.

(c) A review of all appropriate information by the department.

(2) A review of a minor project does not require any of the following:

(a) Submission of the application materials by the department to any of the individuals or agencies listed in section 23(1) of the act.

(b) A 20-day comment period as provided for in section 23 of the act.

(c) A public hearing.

(3) Required plans and specifications for a minor project do not need to be prepared by a licensed professional engineer.

(4) The following alterations and repairs shall be considered minor projects pursuant to section 27 of the act if the activity involves a temporary drawdown of 2 feet or less or involves a temporary drawdown where the dam owner is the sole riparian to the lands surrounding the impoundment:

(a) Dredging or filling of more than 25 cubic yards, but less than 300 cubic yards, as a single and complete project. For dredging projects, the project will not be considered minor unless evidence is provided with the application that the materials to be dredged are not contaminated pursuant to the provisions of Act No. 64 of the Public Acts of 1979, as amended, being S299.501 et seq. of the Michigan Compiled Laws.

(b) Erosion protection measures that fulfill an identifiable need for erosion protection, bank stabilization, or the protection or improvement of the dam and its inlet and outlet channels. The fill material that is associated with erosion protection measures shall be in compliance with any of the following provisions:

(i) It shall have a volume of more than 25 cubic yards, but shall not have a volume of more than 300 cubic yards.

(ii) It shall not have a surface area of more than 10,000 square feet.

(iii) There shall not be more than 2 cubic yards per lineal foot.

(c) Other repairs and alterations that have a minimal effect on the structural integrity of the dam.

(5) Dredging or filling in volumes of less than 25 cubic yards shall be considered maintenance and does not require a permit pursuant to the provisions of the act.

History: 1993 AACS.

R 281.1307 Performance bonds.

Rule 7. (1) As authorized by the provisions of section 31(5) of the act, a permit to construct a new dam or reconstruct a failed dam may require a performance bond. A performance bond may be in the form of any of the following:

(a) A surety bond.

(b) A secured trust fund.

(c) A letter of credit.

(d) Insurance.

(e) A financial test.

(f) A corporate guarantee.

(g) Another suitable instrument or mechanism.

(h) A combination of the items listed in subdivisions (a) to (g) of this subrule as approved by the department.

The department shall consider an applicant's past performance in determining if a performance bond shall be required.

(2) The performance bond shall be secured and documentation shall be submitted to the department before the commencement of construction. The

bond, instrument, mechanism, or fund or combination of these methods of assurance shall be in the amount equal to a reasonable estimate of the cost, adjusted for inflation, that is required to adequately complete a project or remove a completed or partially completed dam and to provide for complete or partial restoration of a project site. Performance bonds may be required in the following instances if there is a reasonable possibility that the permittee may not complete the project:

(a) Where total project completion is essential for the protection of public health, welfare, or safety or to protect natural resources and the public trust in those natural resources.

(b) For temporary dams or dams that are constructed or reconstructed for a specific purpose and period of time after which removal is planned.

(c) For phased construction projects where dam construction or reconstruction is an integral and necessary part of the total project and is to be phased in over a number of years.

(d) Projects to be constructed in the future to mitigate the loss of natural resources or environmental degradation.

History: 1993 AACS.

R 281.1308 Project completion explained.

Rule 8. Pursuant to the provisions of section 35(1)(a) of the act, completion of a new, reconstructed, enlarged, repaired, or altered dam occurs when all the work depicted on all approved drawings and all specification requirements have been accomplished and all permit conditions have been implemented before the expiration of a permit.

History: 1993 AACS.

R 281.1309 Inspection schedule.

Rule 9. Inspection reports that are prepared pursuant to the provisions of R 281.1310 are due on a calendar year basis. The department shall notify the dam owner of the due date, by certified mail, not later than January 31 of the year in which the inspection report is due. In establishing an inspection schedule, as authorized pursuant to the provisions of section 37(2) of the act, the department shall compile an alphabetical listing of dams in each hazard potential classification of high, significant, and low. The inspection schedule shall be established based on the following provisions:

(a) For high hazard potential dams, every third dam in the alphabetical listing of these dams shall be inspected each year as follows:

(i) The first, fourth, seventh, tenth, and so on dam in the alphabetical listing will be due for inspection the first year.

(ii) The second, fifth, eighth, eleventh, and so on dam in the alphabetical listing will be due for inspection the second year.

(iii) The third, sixth, ninth, twelfth, and so on dam in the alphabetical listing will be due for inspection the third year.

(iv) The cycle shall be repeated every 3 years.

(b) For significant hazard potential dams, every fourth dam in the alphabetical listing of these dams shall be inspected each year as follows:

(i) The first, fifth, ninth, thirteenth, and so on dam in the alphabetical listing shall be due for inspection the first year.

(ii) The second, sixth, tenth, fourteenth, and so on dam in the alphabetical listing shall be due for inspection the second year.

(iii) The third, seventh, eleventh, fifteenth, and so on dam in the alphabetical listing shall be due for inspection the third year.

(iv) The fourth, eighth, twelfth, sixteenth, and so on dam in the alphabetical listing shall be due for inspection the fourth year.

(v) The cycle shall be repeated every 4 years.

(c) For low hazard potential dams, every fifth dam in the alphabetical listing of these dams shall be inspected each year as follows:

(i) The first, sixth, eleventh, sixteenth, and so on dam in the alphabetical listing shall be due for inspection the first year.

(ii) The second, seventh, twelfth, seventeenth, and so on dam in the alphabetical listing shall be due for inspection the second year.

(iii) The third, eighth, thirteenth, eighteenth, and so on dam in the alphabetical listing shall be due for inspection the third year.

(iv) The fourth, ninth, fourteenth, nineteenth, and so on dam in the alphabetical listing shall be due for inspection the fourth year.

(v) The fifth, tenth, fifteenth, twentieth, and so on dam in the alphabetical listing shall be due for inspection the fifth year.

(vi) The cycle shall be repeated every 5 years.

(d) Depending on its hazard potential classification, a new, reconstructed, or enlarged dam shall be scheduled for inspection 3, 4, or 5 years after the date of written notice of final project approval as required pursuant to the provisions of section 35(2) of the act or 3, 4, or 5 years after the expiration date of the permit if final approval cannot be granted. The cycle shall be repeated every 3, 4, or 5 years according to the dam's hazard potential classification.

(e) If the hazard potential classification of a dam changes, its next inspection shall be scheduled based on the date of its previous inspection and the cycle of inspections required for the new hazard potential rating.

(f) If an existing dam is discovered that falls under the authority of the act, it shall be added to the end of the appropriate alphabetical listing, and its first inspection shall be scheduled based on the system described in subdivisions (a) to (c) of this rule. If the department determines that a condition may exist that endangers the dam, an inspection shall be required immediately.

(g) The department may alter the inspection schedule in consideration of the dates of recent inspections and department-permitted and approved repairs and alterations.

(h) Owners of more than 1 dam may request that the department schedule their inspection reports to be due the same year if the dams have the same hazard potential classification.

History: 1993 AACS.

R 281.1310 Inspection reports.

Rule 10. (1) Inspection reports shall include all of the information required in section 37(3) of the act.

(2) An inspection report shall include all of the following parts:

(a) A title sheet that includes all of the following information:

(i) The name of the dam.

(ii) The inventory identification number.

(iii) The county and river or stream where the dam is located.

(iv) The owner's and operator's names, addresses, and telephone numbers.

(v) The hazard potential classification.

(vi) The names of inspectors.

(vii) The date of inspection.

(viii) The name, address, registration number, and signature of the licensed professional engineer who is in charge of the inspection report.

(b) A conclusions and recommendations section that includes all of the following information:

(i) An evaluation of the dam's overall condition and a summary of the findings of the field inspection and analyses contained in the report.

(ii) Identification of any deficiencies that, if left uncorrected, could lead to the failure of the dam.

(iii) Prioritization of recommendations to correct observed deficiencies or operation and maintenance items for the dam.

(iv) Recommendations for further detailed studies or investigations, including an assessment of the adequacy of the current hazard potential classification if appropriate.

(c) A project information section that includes all of the following information:

(i) A description of the dam, outlet, spillway, and other principal features, together with pertinent data.

(ii) The purpose of the dam.

(iii) A summary of available design, geotechnical, maintenance, construction, repair, and alteration information and operating history.

(iv) A reference to past inspection reports.

(v) The date of construction, if known.

(d) A field inspection section that briefly describes the physical condition of the principal features of the dam and appurtenant structures, including the impoundment level, as they were observed during the field inspection.

(e) A structural stability section that includes a visual assessment of the stability of the dam on the basis of available data, together with the observations of the field inspection and the results of any calculations performed.

(f) A hydrologic and hydraulic section that includes an evaluation of spillway adequacy, including a description of pertinent available information, such as any of the following:

(i) Hydrologic design data provided by the department.

(ii) Drainage area.

(iii) Floods of record.

(iv) Previous evaluations.

(g) An operation and maintenance section that includes all of the following:

(i) An assessment of operating equipment and procedures.

(ii) Evaluation of the current maintenance plan.

(h) Appendices that include all of the following:

(i) A map that shows the location of the dam.

(ii) Engineering plans of the dam, if available, or sketches of the dam and its principal parts, including a plan view and cross sectional views of pertinent features. If there have been changes to the dam since the submittal of previous plans or sketches, supplemental plans or sketches that depict the changes shall be submitted. If engineering plans or sketches have been submitted in a previous inspection report and if there have been no changes to the dam, it is not necessary to submit duplicate plans or sketches in subsequent reports.

(iii) Photographs of the dam, downstream channel, and deficiencies cited in the report.

History: 1993 AACS.

R 281.1311 Emergency action plans.

Rule 11. (1) An emergency action plan for a high or significant hazard potential dam shall be submitted to the county or local emergency management coordinator for review for consistency with county or local emergency operations plans and the Michigan emergency preparedness plan. An emergency action plan for an existing dam shall be submitted to the department with documentation that the plan has been submitted to the county or local emergency management coordinator not later than the time that the first inspection report for the dam is due or at another time agreed to by the department. An emergency action plan for a newly constructed dam shall be submitted to the department with documentation that the plan has been submitted to the county or local emergency management coordinator not later than the date of expiration of the permit for construction of the dam, including any extensions of time for completion.

(2) At the time subsequent inspection reports are due, the owner shall determine if the plan is up to date. The owner shall advise the department of the findings of this review and shall submit any revisions to the department and to the county or local emergency management coordinator.

(3) The emergency action plan shall include a description of the circumstances under which it shall be activated, what actions shall be taken, and who shall be responsible to take those actions when the plan is activated.

(4) The emergency action plan shall include the name, address, and telephone number of all of the following entities:

(a) The person who is responsible for the operation of the dam.

(b) The alternate person who is responsible for the operation of the dam.

(c) The local emergency management coordinator or coordinators.

(5) The emergency action plan shall include either of the following:

(a) A listing of occupied facilities, buildings, and residences that may be threatened with flooding due to the failure of the dam.

(b) Mapping that is adequate to clearly delineate the areas of potential inundation resulting from a failure of the dam.

The degree of detail for mapping or listings shall be determined through consultations between the dam owner and the appropriate emergency services agencies that are responsible for implementing the emergency action plan.

History: 1993 AACS.

R 281.1312 Administrative monetary penalties.

Rule 12. (1) As authorized pursuant to the provisions of section 51(8) of the act, an administrative penalty of not more than $500.00 per day may be assessed to a person as set forth in the schedule in subrule (2) of this rule for any of the following reasons:

(a) Violation of any or all of the conditions of a minor project permit that is issued pursuant to the provisions of section 27 of the act.

(b) Failure to submit an inspection report as required pursuant to the provisions of section 37 of the act.

(c) Failure to provide a more detailed investigation or evaluation of certain dam features as required by section 37(5) of the act.

(d) Failure to comply with a first department order to limit dam operations as authorized pursuant to the provisions of section 39(1) of the act where significant impairment of resources has not resulted.

(e) Failure to notify the department and affected off-site public authorities and safety agencies, pursuant to the provisions of section 41(1) of the act, of any flood or unusual circumstance or occurrence, within 24 hours of the circumstance or occurrence, that endangers the safety of a dam, but where significant damage to property or natural resources does not occur.

(f) Failure to notify the department of actions taken in response to emergency conditions pursuant to the provisions of section 41(2) of the act.

(g) Failure to comply with the provisions of an emergency order that relates to any of the following as authorized pursuant to the provisions of section 43(2) of the act:

(i) Maximum drawdown levels and discharge rates.

(ii) Conducting required sediment surveys, water quality sampling, or monitoring.

(iii) Any other requirement where significant impairment of resources has not resulted.

(h) Failure to prepare, keep current, and submit to the department an emergency action plan as required pursuant to the provisions of section 47 of the act.

(i) Failure to comply with a first order to comply with permit conditions or to restore the site affected to its original condition pursuant to the provisions of section 49(1) of the act.

(j) Violation of any of the following permit conditions:

(i) Failure to supply data or information.

(ii) Failure to provide required minimum flow releases where significant impairment of resources has not resulted.

(iii) Violation of any permit condition where significant impairment of resources has not occurred.

Each violation and act of noncompliance and each day such a violation or act occurs or continues to occur will be considered a separate violation.

(2) The following administrative penalty schedule shall apply for noncompliance or violations as set forth in subrule (1) of this rule:

(a) First through the fifth day the violation occurs - not more than $100.00 per day.

(b) Sixth through the tenth day the violation occurs - not more than $200.00 per day.

(c) Eleventh through the fifteenth day the violation occurs - not more than $300.00 per day.

(d) Sixteenth through the twentieth day the violation occurs - not more than $400.00 per day.

(e) Twenty-first day until the violation is resolved - not more than $500.00 per day.

(3) All administrative penalties will be assessed by written notice from the department. The notice shall state the specific reasons for the penalty, the number of days the department considers the person in violation, and the total amount due based on the schedule in subrule (2) of this rule.

(4) If so requested, the department shall provide a person, subject to the administrative penalty provisions of section 51(8) of the act, an opportunity for a hearing pursuant to the provisions of Act No. 306 of the Public Acts of 1969, as amended, being S24.201 et seq. of the Michigan Compiled Laws.

(5) Notice of intent to assess administrative penalties pursuant to section 51(8) of the act shall be given either through written notice by certified mail or personal service on the person by the director, his or her designated representative, or a peace officer.

(6) Penalties that are administered pursuant to the provisions of section 51(8) of the act may be in addition to any other penalties or remedies authorized by the act or its rules.

History: 1993 AACS.

R 281.1313 Dams exempt from rules.

Rule 13. A dam is exempt from these rules if it is exempt from the act pursuant to the provisions of section 13(2) and (3) of the act.

History: 1993 AACS.

DAM REMOVAL GUIDELINES FOR OWNERS
Michigan Department of Natural Resources
Michigan Department of Environmental Quality
April 2004[1]

Michigan has over 2500 dams, many of which were built decades ago. As dams age, they require regular inspection, periodic maintenance and sometimes very costly repair. As dams outlive their usefulness, and their condition deteriorates, consideration should be given to remove, rather than repair a dam. Old dams may be less costly to remove, than they are to repair.

The driving forces for consideration of dam removal are 1) the cost of maintenance and repair when the benefits of maintaining a dam are diminished; 2) public safety and liability concerns, and 3) potential fisheries, water quality and recreational use improvements that can be realized with dam removal.

The purpose of this guidance document is to suggest issues that may need to be considered when deciding the future of a dam, and to assist in implementing a dam removal project. The steps outlined here are by no means complete; however, they can help dam owners and their communities develop a long-term plan for the dam which includes consideration of financial, public safety and environmental issues. If you have questions about the laws regulating dams, please contact the Department of Environmental Quality, Dam Safety Program staff in the Geology and Land Management Division, 517-335-3195 or visit the web site at: http://www.michigan.gov/deqglmd and click on "dam safety".

First Step: Consider What Purposes the Dam Serves

A. Consider whether the dam itself provides any benefits, such as:
   a. Power production.
   b. Prevents movement of sea lamprey or other aquatic nuisance species.
   c. Fish exclusion for fisheries management purposes.
   d. Historic significance.
   e. Provides bridge, rail or road crossing.

B. Consider whether the impoundment created by the dam may serve one or more of the following services:
   a. Water supply for irrigation, fire suppression.
   b. Flood control.
   c. Navigation and transportation.
   d. Recreational boating, fishing, swimming or park use.

[1] Drafted by the MDNR Habitat Management Unit of the Fisheries Division and the DEQ Dam Safety Program of Geology and Land Management Division.

Second Step: Consider Problems with the Dam Structure

A. Safety and Security of the Dam

a. Do boats, canoes or swimmers frequent the site – are they at risk?
b. Does the site attract anglers?
c. Is the dam itself in poor condition and/or subject to an order from DEQ to repair or remove the dam?
d. What potential property damage would occur if the dam was to fail?

B. What are the Costs and Liabilities of Keeping the Dam
a. Repair cost estimate.
b. Maintenance cost estimate.
c. Operational concerns.

C. What Environmental Impacts Should Be Considered? (Consult your local DNR and DEQ offices for assistance).
a. Water quality and aquatic habitat benefits of stream restoration.
b. Improvement of fisheries and wildlife habitat.
c. Recreational uses of the impoundment compared to a restored stream.
d. Other ecological or economic considerations.

Third Step: Considerations for Dam Removal

A. Would Removal Eliminate or Reduce Safety and Security Problems?

B. Would Removal Improve Recreational Use of the Site?

C. Cost Estimates
e. Preliminary estimate of dam removal cost.
f. Sediment removal or management.
g. Stream bank restoration.
h. Replacement of dam dependent services (water supply, road or bridge crossing, etc).

C. Potential Funding Sources
a. Private or Community Foundation funding
b. Environmental Grants
c. State or Federal Assistance Programs

Fourth Step: Working with DEQ Dam Safety Program and/or DNR Fisheries Division

A. Contact the DEQ dam safety program for information about the condition of the dam, and for permit application requirements and procedures.

B. Contact the DNR, Fisheries Division for Information about the fisheries and wildlife values with and without the dam.

C. General guidance on the removal of a dam (if a viable option).

D. Information about potential funding sources for dam removal (if a viable option).

E. Other requirements for planning, design and modification of the dam.

Fifth Step: Explore Resident and Community Concerns Including Local Watershed Council, Conservation Clubs, Economic Development Groups, others

A. Historic and aesthetic values of the dam and or impoundment
   a. Does the dam help define the community or suggest specific important aspects of its history? What alternatives may be considered to retain a portion of the dam as a monument to its history in the community?
   b. Would creation of an off-channel pond retain recreational uses or aesthetic values, while allowing return of a free-flowing river?
   c. What fisheries and wildlife values would likely occur in the area with and without the dam?

B. Property Owners Interests
   a. Residents of the impoundment may or may not have riparian rights to the water (access).
   b. Property values may change with and without the dam.
   c. Lake association or other resident or adjacent park owners may be interested in taking over ownership and maintenance of the dam.

C. Other Social Issues
   a. Public safety issues with or without the dam
   b. Park or other public and use of the area: projected changes
      i. Alternatives to preserve or replace valued recreational uses
   c. Flooding concerns – hydraulic analysis may be needed to project how floodplains would be altered if the dam were breached
   d. Other local economic considerations (waterfront business development with and without the dam).

Sixth Step: Collect and Assess Information (Professional Engineering and/or Legal Services Necessary)

A. Legal Issues
   a. Who owns the dam structure and surrounding lands?
   b. Any riparian ownership or flowage rights?
   c. Any potential sources of sediment contamination?
   d. Regulatory concerns or limitations?

B. Engineering Issues
   a. Condition of the dam and deadlines to take action (if appropriate).
   b. Accessibility to the dam for repair or removal.
   c. Potentially affected structures (e.g. bridges, utility crossings).
   d. Sediment quantification and removal.
   e. Flood storage capacity and changes in floodway.
   f. Upper limit of the impounded stream.
   g. Hydrology (gage data or hydrologic model).
   h. Alternatives to modify or remove the dam.

C. Economic Issues
   a. Final cost estimate of dam repair/rehabilitation of the impoundment.
   b. Potential liability in the event of dam failure.
   c. Potential operation, maintenance and repair cost savings.

Seventh Step: Taking Action

A. Secure Local, State and Federal Permits.

B. Complete Site Land Survey, Final Design Engineering Plans.

C. Secure Funding (construction, site restoration and monitoring).

D. Determine Sediment Management Plan (may include dredge and disposal or in place stabilization as recommended by DEQ and DNR).

E. Secure Authorization for Site Access.

Resources

For further information about dam removals in Michigan:
http://www.michigan.gov/dnrdams

For dam removal information from the conservation organization, American Rivers:
http://www.americanrivers.org/damremoval/default.htm

From the River Alliance of Wisconsin, information on the small dam removal program:
http://www.wisconsinrivers.org/SmallDams/prog_dams.html

From the Heinz Center for Science, Economics and the Environment, 2 reports on Dam Removal Research:
http://www.heinzcenter.org

1000 Rochester Hills Drive
Rochester Hills, MI 48309
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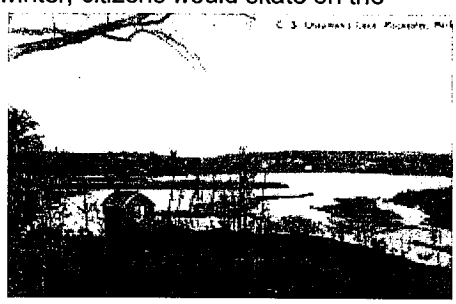
History

·Our Community's History - ·Blizzard of 1886 - ·Calvin H. Greene - ·Charles Chapman House - ·Chapman Pond - ·Clinton-Kalamazoo Canal - ·D.M. Ferry Company - ·Detroit-Pavilion Hotel - ·Detroit Sugar Mill - ·Detroit United Railway - ·Dillman and Upton - ·Joshua Van Hoosen's Big Barn - ·King's Cove - ·Log Cabins - ·Marsden C. Burch - ·Mills - ·One-Room Schoolhouses - ·Parke-Davis Farm - ·Railroads - ·Rock & Roll - ·Sarah Van Hoosen Jones' Childhood Pets - ·Ski Slide - ·Snow Storm of 1918 - ·St. Andrews Church - ·St James Hotel - ·Stony Creek or Stoney Creek - ·Subdivisions - ·Taylor-Van Hoosen-Jones Family History - ·Uriah Adams - ·Volcanoes - ·Woodward School

Chapman Pond

In the early twentieth century, the Western Knitting Mills (once called the Rochester Woolen Mills) built a dam (later called McAleer Dam) on Paint Creek to raise the water level in the creek and pond. The water would be used to provide power to the Western Knitting Mills. The new dam formed a millpond and was known as Chapman Lake (or Pond). The name probably came from Western Knitting Mills vice president Charles Chapman or his brother William Chapman, who was the treasurer for the company. In 1901, the lake was expanded to 12 acres and the dam improved. A 25-foot fall provided power for the mill. The lake was located on the east side of Main Street, just north of Fifth Street. It ran from Oak Bluff, Charles Chapman's home, to the bottom of Elizabeth Street. On the west side of the lake was the Detroit United Railway (D.U.R.) car barns, freight house and power plant.

There was a small island in Chapman Lake, which was called, "Scout's Island" because it was often used for Boy Scout excursions. It was also a popular fishing spot, offering a serene location for boy scouts and fishermen alike. During the winter, citizens would skate on the frozen lake. The Western Knitting Mills was in possession of the lake until after World War I when the mill was sold to different parties. It was closed in 1927 due to declining business, reopened, and closed once again in 1931. The Bradley Knitting Company of Wisconsin bought the factory, repaired and altered it, but did not alter the lake. The mill was reopened in 1933 to make mittens for the Civilian Conservation Corps. It too closed in 1939 until the McAleer Manufacturing Company bought the mill in 1941. Several companies occupied the mill after that but from 1941 on, not one of the companies used



the dam to generate power because generators were installed to transmit electric power to the mills.

On June 18, 1946 heavy rainfall caused a dam to burst at Rudd's Mill (near Lake Orion). It was not long before the flood reached McAleer Dam causing the land around it to give way and unleash Chapman Lake (the dam remained standing). The eastern side of Rochester was flooded; Chapman Lake's waters damaged several homes and businesses, railroad tracks, and even killed one woman. Efforts to force the lake's waters back into the channel were unsuccessful. In the late summer, the lake site was filled with sand and gravel from an old hill and the water drained. The leveled hill became apartments and homes on Elizabeth Street and other streets overlooking the old millpond. The drained land was called Olde Towne and East University was extended across Paint Creek and on to Elizabeth. An Elks Lodge was built near the old millpond site and today, where Scout's Island was once located, stands the Rochester Hills Public Library.

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LEGAL LIABILITY FOR DAM FAILURES

PROFESSOR DENIS BINDER

TABLE OF CONTENTS

I. INTRODUCTION 1

II. THEORIES OF LEGAL LIABILITY 2

A. NEGLIGENCE 2

1. General Standard of Care 2
2. Architects and Engineers 4
3. Parties Protected by the Duty of Care 9
4. Design and Construction of a Dam 10
5. Inspection and Maintenance 14
6. Operations During a Flood 19

B. STRICT LIABILITY 22

C. "ACTS OF GOD" AND THE PROBABLE MAXIMUM FLOODS 29

D. THE RISKS OF COMPLYING WITH MINIMAL GOVERNMENT OR PROFESSIONAL STANDARDS 35

E. THE RISKS INHERENT IN DESIGN TRADE-OFFS 38

III. CAUSATION 41

IV. DAMAGES 45

V. CONCLUSION 48

I. INTRODUCTION

In assessing the potential liability for a dam failure in the United States, it is best to start with several premises. First, each state is a separate jurisdiction free to impose its own theories of recovery as well as limitations on liability. Thus, legal standards in Maine may be inapplicable to California. Second, even though legal principals may vary by jurisdiction, principals of engineering apply universally. Third, in today's litigious society it is safe to assume that in the case of a catastrophic dam failure, extensive litigation will ensue. Any competent lawyer, representing the victims, will sue all possible wrongdoers in seeking redress. Lawsuits will therefore most probably be filed against everyone remotely connected to the dam's existence, including the architects, engineers, contractors, sub-contractors and consultants involved in the original construction, as well as those responsible for any subsequent modifications. Potential defendants would clearly include the owners and operators of the facility, quite possibly the state engineer or private dam safety inspectors, and conceivably any insurance company which performed a safety inspection of the facility. Fourth, regardless of the jurisdiction, should a dam failure result in loss of life, personal injury or substantial property damage, it is fairly certain today that most jurisdictions will fashion a means to compensate the victims. The basis for these premises is that the overriding purpose of modern tort law is to compensate an innocent victim for any injuries caused by the wrongful acts of another.

It should be noted that accidents and tragedies are all too common in the normal course of operations of a dam and its reservoirs. For example, drownings and less serious accidents occur; canoes and other recreational craft can pass over the top of the dam, and boaters may be trapped in the toe of the dam. See e.g., Andrews v. United States, 801 F.2d 644 (3rd Cir. 1986) (six drownings and one survivor when two motorboats went over crest of dam.) In addition, loss of

life and serious injuries are highly foreseeable during construction of any major project, such as a dam. See e.g., Granite Construction Co. v. Superior Court of Fresno County, 100 Cal App. 3d 465, 197 Cal. Rptr. 3 (5th Dist. 1983), where seven construction workers fell to their deaths when scaffolding collapsed during construction of a pumped storage facility.

However, for purposes of this article, we are dealing only with the liability issues that arise out of the sudden failure of a dam. Failure is defined in terms of the uncontrolled release of reservoir water. Such a failure may be of a massive, catastrophic nature, as with the well known Teton Dam Disaster, or of a lesser magnitude. The purpose of this article is to outline the legal liability issues that arise from these failures. In doing so, we shall often look to non-dam cases to ascertain the appropriate legal standards since general legal theories of recovery often transcend specific applications.

Our perspective will be that of the innocent victims of the failure. We do not deal with the problems that may arise between the owner of the dam and those responsible for the design, engineering or construction of the facility. Those issues generally involve traditional matters of contract law, and are often addressed in a written contract between these parties.

II. THEORIES OF LEGAL LIABILITY

A. NEGLIGENCE

1. General Standard of Care

Negligence is the most commonly utilized cause of action both in general tort litigation and in dam failure cases. Negligence is defined in terms of the failure to exercise the standard of care of a reasonable person under similar circumstances. This standard in turn is based upon the reasonable foreseeability of the risk. Charvoz v. Bonneville Irr. Dist., 235 P.2d 780, 783 (Utah 1951). The legal duty of reasonable care becomes a calculus of three components: the risk of an

accident occurring, the magnitude of harm should the risk materialize, and the availability of alternatives.

The classic formula was expressed by the distinguished jurist, Judge Learned Hand, in Conway v. O'Brien, 111 F.2d 611, 612 (2nd Cir. 1940):

> The degree of care demanded of a person by an occasion is the resultant of three factors: The likelihood that his conduct will injure others, taken with the seriousness of the injury if it happens, and balanced against the interest which he must sacrifice to avoid the risk. All these are practically not susceptible of any quantitative estimate, and the second two are generally not so, even theoretically. For this reason a solution always involves some preference, or choice between incommensurables, and it is consigned to a jury because their decision is thought most likely to accord with commonly accepted standards, real or fancied.

In terms of dam safety, we can rephrase Judge Hand's factors as follows:

a) How likely is a dam to fail?

b) What are the potential consequences should it fail?

c) What safety precautions are available?

It is important to emphasize that the ultimate question though is not foreseeability per se, but whether in light of that foreseeability, how a reasonable person would have acted, taking into account the potential magnitude of harm, and the alternatives available. For example, if a specified flood were foreseeable, but highly improbable, should a dam engineer design the structure to handle that degree of flooding, or to meet a lesser standard? In this respect, if litigation ensues after a dam failure, both plaintiffs and defendants would introduce expert testimony on the standard of care to be exercised under the circumstances. The appropriate

standard would then be determined by the trier of fact, which is usually a jury. Except when there is no reasonable dispute over the issue, the foreseeability of harm arising from defendant's conduct is a question of fact for the jury. Diamond Springs Lime Co. v. American River Constructors, 16 Cal. App. 3d 581, 597, 94 Cal. Rptr. 200, 207 (1971).

It should be noted that although negligence analysis primarily deals with case law, the requisite duty of care may also be established by statutes, regulations, contracts, or professional codes. Architects and engineers must comply with statutory and administrative requirements, such as building codes. These sources of conduct will usually establish the minimum standard of care to which the professional must adhere. Violation of a statute or ordinance therefore constitutes negligence. Burran, Jr. v. Dambold, 422 F.2d 133 (10th Cir. 1970); Henry v. Britt, 220 So.2d 917 (Fla. Ct. App. 1969).

2. Architects and Engineers[1]

The concept of architect/engineer liability is not novel. The Code of Hammurabi provided that in the case of "a house being so carelessly built as to cause death to the owner's son", the builder's son was to be put to death. See Witherspoon, Architects and Engineer's Liability, 16 D.L.J. 406 (1967). Obviously, the law is not so Draconian today, but the culpable architect/engineer may still find "an ounce of flesh" being exacted in civil liability.

The general American standard of care of an architect was set forth in an early Maine case, Coombs v. Beede, 89 Me. 187, 188-89, 36 A. 104, 105 (1896):

> The undertaking of an architect implies that he possesses the skill and ability . . . sufficient to enable him to perform the required services at least ordinarily and reasonably well . . . But the

[1]Architects and engineers are used interchangeably in this context because the courts have treated them similarly for liability purposes.

> undertaking does not imply or warrant a satisfactory result . . . An error of judgment is not necessarily evidence of a want of skill or care, for mistakes and miscalculations are incident to all the business of life.

This standard is still generally accepted in that an architect/engineer is not an absolute insurer of his work. Thus, he is not strictly liable for errors that may occur. See e.g. K-Mart Corp. v. Midcon Realty Group of Connecticut, Ltd., 489 F. Supp. 813, 819 (D. Conn. 1980); Chapel v. Clark, 117 Mich. 638, 76 N.W. 62 (1898); Chubb Group of Insurance Cos. v. C.F. Murphy & Associates, 656 S.W.2d 766 (Mo. Ct. App. 1983); Van Ornum v. Otter Tail Power Co., 210 N.W.2d 188, 201 (N.D. 1973); LaRossa v. Scientific Design Co., 402 F.2d 937, 942-43 (3rd Cir. 1968) (no strict liability in New Jersey for designing or engineering a plant); Stuart v. Crestview Mutual Water Co., 34 Cal. App. 3d 802, 811-12, 110 Cal. Rptr. 543, 549-50 (1973) (engineers not strictly liable in tort); Swett v. Gribaldo, Jones & Associates, 40 Cal. App. 3d 573, 575, 115 Cal. Rptr. 99, 101 (1st Dist. 1974) (no strict liability for soil engineers in 200 unit development); C.F. Abdul-Warth v. Arthur G. McKee & Co., 488 F. Supp. 306 (E. D. Pa. 1980).

Thus, in the absence of a specific agreement, the architect/engineer does not employ or guarantee a perfect plan or satisfactory result. As expressed in City of Mounds View v. Walijarvi, 263 N.W.2d 420, 424 (Minn. 1978):

> The reasoning underlying the general rule as it applies . . . to architects . . . is relatively straightforward. Architects . . . engineers, and others deal in somewhat inexact sciences and are continually called upon to exercise their skilled judgment in order to anticipate and provide for random factors which are incapable of precise measurement. The indeterminate nature of these factors makes it impossible for professional service people to gauge them with complete accuracy in every instance. Thus . . . an architect cannot be certain that a structural design will interact with natural forces as anticipated. Because of the inescapable possibility of error which inheres in these services, the law has traditionally required, not perfect results, but rather the exercise of that skill and judgment

> which can be reasonably expected from similarly situated professionals . . . .

In rejecting strict liability as a basis for liability, the court stated:

> If every facet of structural design consisted of little more than the mechanical application of immutable physical principles, we could accept the rule of strict liability which . . . [plaintiff] proposes. But even in the present state of relative technological enlightenment, the keenest engineering minds can err in their most searching assessment of the natural factors which determine whether structural components will adequately serve their intended purpose. Until the random element is eliminated in the application of architectural sciences, we think it fairer that the purchaser of the architect's services bear the risk of such unforeseeable difficulties.

Id. In other words, the courts recognize that engineering is not an exact science; totally risk-free engineering is unachievable.

A minority of jurisdictions have reached a contrary result. See Broyles v. Brown Engineering Co., 151 S.2d 767, 772 (Ala. 1963); Board of Education v. Del Bianco & Assoc., 372 N.E.2d 953, 959 (Ill. 1978); Tamarac Dev. Co. v. Delamater, Freund & Assoc., 675 P.2d 361, 365 (Kan. 1984).

At a minimum, the architect/engineer impliedly promises to exercise the standard of reasonable care required of members of the profession. See Klein v. Catalano, 386 Mass. 701, 7l8, 437 N.E.2d 514, 525 (1982). Milton v. Womack, Inc. v. House of Representatives, 509 So.2d 62, 64 (La. Ct. App.); writs denied, 513 So.2d 1208, 1211 (La. 1987). See also, Housing Authority of City of Carrollton v. Ayers, 211 Ga. 728, 733, 88 S.E.2d 368, 373 (1955) ("The law imposes upon persons performing architectural, engineering, and other professional and skilled services the obligation to exercise a reasonable degree of care, skill, and ability, which generally is taken and considered to be such a degree of care and skill as, under similar conditions and like surrounding circumstances, is ordinarily employed by their respective professions.") See also,

Clark v. City of Seward, 659 P.2d 1227 (Alaska 1983); A.L.I., RESTATEMENT (SECOND) OF TORTS § 299A (1977).

Architects are also charged with knowing the building restrictions imposed by the appropriate jurisdiction, such as through a city's building or zoning code. Bebb v. Jordan, 111 Wn. 73, 189 P. 553 (1920); Maritime Construction Co. v. Benda, 262 So.2d 20 (Fla. Ct. App. 1972).

It should be noted that while architects and engineers are not normally subject to strict liability for their work, a caveat is that those who intentionally undertake or join in an abnormally dangerously activity may be held to bear the consequences resulting from harm to others. Doundoulakis v. Town of Hempstead, 42 N.Y.2nd 440, 448, 368 N.E.2nd 24, 29 (1977).

To reiterate, the generally accepted standard of care required of an architect/engineer today is to exercise the same standard of care, skill and diligence as others in the profession ordinarily exercise under like circumstances. See Cowles v. City of Minneapolis, 128 Minn. 452, 151 N.W. 184 (1915) (case involved a civil engineer). In a subsequent case involving an architect, the Minnesota Supreme Court elaborated upon the general standard as follows:

> The circumstances to be considered in determining the standard of care, skill, and diligence to be required . . . include the terms of the employment agreement, the nature of the problem which the supplier of the service represented himself as being competent to solve, and the effect reasonably to be anticipated from the proposed remedies upon the balance of the system."

City of Eveleth v. Ruble, 302 Minn. 249, 254, 225 N.W.2d 521, 524-5 (1974). A similar standard was adopted in Pennsylvania:

> An architect is bound to perform with reasonable care the duties for which he contracts. His client has the right to regard him as skilled in the science of the construction of buildings, and to expect that he will use reasonable and ordinary care and diligence in the application of his professional knowledge to accomplish the

> purpose for which he is retained. While he does not guarantee a perfect plan or a satisfactory result, he does by his contract imply that he enjoys ordinary skill and ability in his profession and that he will exercise these attributes without neglect and with a certain exactness of performance to effectuate work properly done.. . . While an architect is not an absolute insurer of perfect plans, he is called upon to prepare plans and specifications which will give the structure so designed reasonable fitness for its intended purpose, and he impliedly warrants their sufficiency for that purpose.

Bloomsburg Mills, Inc. v. Sordoni Construction Co., 401 Pa. 358, 361, 164 A.2d 201, 203 (1960); See also Seiler v. Levitz Furniture Co., 367 A.2d 999, 1007-8 (Del. 1976).

In Aetna Insurance Co. v. Hellmuth, Obata & Kassabaum, Inc., 392 F.2d 472, 477 (8th Cir. 1968), the court stated:

> The standard of care applicable is that of ordinary reasonable care required of a professional skilled architect under the same or similar circumstances in carrying out his technical duties in relation to the services undertaken by his agreement. This includes the knowledge and experience ordinarily required of a member of that profession and includes the performance of skills necessary in coping with engineering and construction problems, which skills are ordinarily not possessed by laymen.

To be realistic, in the case of a major catastrophe such as the Hyatt Regency Skywalk collapse in Kansas City, it will be very difficult for the architect/engineer to escape a finding of negligence short of settling the case. Detailed examinations of structural and systems failure will usually lead to human error as the cause. In general, see H. PETROSKI, TO ENGINEER IS HUMAN (1982). Once human error is identified as a cause of the accident, then lawyers for the victims will often be able to translate the human error into legal negligence.

In addition to legal liability, engineering failures, as with the Hyatt Regency Kansas City disaster, may result in the loss of the responsible party's professional license. See Duncan v. Missouri Board for Architects, Professional Engineers and Land Surveyors, 744 S.W.2d 524 (Mo. Ct. App. 1988).

3. Parties Protected by the Duty of Care

The duty of reasonable care extends to those foreseeably injured by the negligence, and not just those in contractual privity with the defendant. See e.g. Navajo Circle, Inc., v. Development Concepts, 373 So. 2d 689 (Fla. Ct. App. 1979), where a condominium association and a unit owner were allowed to seek damages to the roof and the exterior walls from the architect for negligently supervising the construction and subsequent repairs of the roof, and also from the contractor for negligently constructing the roof. See also Kristek v. Catron, 7 Kan. App. 2d 495, 644 P.2d 480 (1982) (contractor liable to a third party); Seiler v. Levitz Furniture Co., 367 A.2d 999 (Del. 1976) (liability of architect/engineer to tenant); Heigh v. Wadsworth, 361 P.2d 849 (Okl. 1961) (contractor liable to purchaser's tenant); Waldor Pump & Equipment Co. v. Orr-Schelen-Meyerson & Co., 386 N.W.2d 375 (Minn. App. 1986); Montijo v. Swift, 219 Cal. App. 2d 351, 33 Cal. Rptr. 133 (1963); Lumber Products, Inc. v. Hiriart, 255 So.2d 783, 787 (La. Ct. App. 1971); S.K. Whitty & Co., Inc. v. Laurence L. Lambert & Assoc., 576 So.2d 599 (La. Ct. App. 1991); Evans v. Howard R. Green Co., 231 N.W.2d 907, 913 (Iowa 1975); Mudgett v. Marshall, 574 A.2d 867 (Me. 1990); Miller v. DeWitt, 59 Ill. App. 2d 38, 112, 208 N.E.2d 249, 284 (Ill. 1965) ("The architects may be liable for negligence in failing to exercise the ordinary skill of their profession, which results in the erection of an unsafe structure whereby anyone lawfully on the premises is injured.") In terms of measuring the potential liability to third parties, the court in Coburn v. Lenox Homes, Inc., 186 Conn. 370, 375 441 A.2d 620, 624 (1982) stated:

> A duty to use care may arise from a contract, from a statute, or from circumstances under which a reasonable person, knowing what he knew or should have known, would anticipate that harm of the general nature of that suffered was likely to result from the act or failure to act.

Liability thus extends, as per ordinary negligence principles, to any person who foreseeably and with reasonable certainty might be injured by a failure to exercise reasonable care. Potential third party claimants include contractors, sub-contractors, construction workers, sureties, tenants, neighbors, visitors, lenders and workers. With respect to dam failures, therefore, this class of foreseeable victims could include the resident population, tourists, travelers, recreational users, workers, commercial enterprises, utilities and governmental entities.

The architect's duty also extends to those injured during construction and not just upon completion of construction. The general duty of care is again based upon reasonable foreseeability. See Evans v. Howard R. Green Co., 231 N.W.2d 907 (Iowa 1975); Miller v. DeWitt, 59 Ill. App. 2d 38, 112, 208 N.E.2d 249, 284 aff'd in part and rev's in part on other grounds, 37 Ill. 2d 273, 226 N.E.2d 630 (1965); Caldwell v. Bechtel, Inc., 631 F.2d 989 (D.C. Cir. 1980); Holt v. A. L. Salzman & Son, 88 Ill. App. 2d 306, 232 N.E.2d 537 (1967). (These cases involved workers injured during construction.)

Consequently, the potential scope of liability is quite extensive.

4. Design and Construction of a Dam

Because of the potential risk involved with a dam failure, the standard of care frequently imposed by courts is that one must use care commensurate with the undertaking; i.e., the duty of reasonable care is measured by the magnitude of the project. Obviously, the standard of care is a sliding one. While slight care might be required for a small stock-watering pond in an unpopulated rural area, it would be grossly improper to use slight care in designing, constructing, or maintaining a large dam overlooking a major population area. As stated in a Maine case involving blasting:

> Care must be taken by a defendant in proportion to the danger involved. In other words, ordinary care depends on the circumstances of each particular case. Where the risk is great a person must be especially cautious.

Albison v. Robbins & White, Inc., 116 A.2d 608, 612 (Me. 1959).

Similarly, Minnesota has held that since the standard of care is in proportion to the risk of injury, the owner must build a dam to meet such extraordinary floods as may be reasonably anticipated. Willie v. Minnesota Power & Light Co., 250 N.W. 809 (Minn. 1933). See also, City Water Power Co. v. City of Fergus Falls, 113 Minn. 33, 37, 128 N.W. 817, 818 (1910). (The owner is bound to exercise in construction and maintenance of the dam a degree of care proportionate to the injuries likely to result to others if it proves insufficient.) See also Herro v. Board of County Road Commissioners for County of Chippewa, 368 Mich. 263, 118 N.W.2d 271 (1962); and Dover v. Georgia Power Co., 168 S.E. 117, 118 (Ga. Ct. App. 1933) (Due care is "in proportion to the extent of the injury which will be likely to result to third persons...") See also Mackay v. Breeze, 269 P. 1026, 1027 (Utah 1928) ("The degree of care required to prevent the escape of water is commensurate with the damage or injury that will probably result if the water does escape").

As stated in the basic treatise on tort law, PROSSER & KEETON ON THE LAW OF TORTS 171 (5th Ed. 1984),

> [I]f the risk is an appreciable one, and the possible consequences are serious, the question is not one of mathematical probability alone. The odds may be a thousand to one that no train will arrive at the very moment that an automobile is crossing a railway track, but the risk of death is nevertheless sufficiently serious to require the driver to look for the train and the train to signal its approach...As the gravity of the possible harm increases, the apparent likelihood of its reoccurrence need be correspondingly less to generate a duty of precaution.

To reiterate, as expressed in a Utah case:

> [T]he degree of care increases in proportion to the hazards to be anticipated; and that because of the dangers inherent in the management of flowing waters, the concept of ordinary care and prudence under the particular circumstances requires that its management not to left to novices, but should only be entrusted to persons of some experience and skill in the management of such waters, who would have an awareness of the various hazards in the failure to properly control them and would therefore exercise the degree of foresight and precaution which people of such experience and skill would observe to avoid injury or damage to others and their property.

Erickson v. Bennion, 28 Utah 2d 371, 374, 503 P.2d 139, 140-41 (1972). If the risk is high enough, therefore, liability approaches strict liability.

In addition, the higher the level of expertise, or degree of training and education, of the person, the greater the standard of care one is held to. For example, if an emergency life-saving operation must be performed on the side of the road, a general practitioner would not be held to the same standard as a skilled surgeon under these circumstances. See A.L.I. RESTATEMENT (SECOND) OF TORTS § 299A, Comment d (1977). Thus, an expert designing, building, or operating a dam will be held to the same degree of care as other experts of the same background, training, education, and experience. Implicit in the requisite standard or care is the duty to stay current in the field. It is also important for engineers to recognize the limits of their expertise; they should not try to do work, particularly of a life-threatening nature, beyond their expertise.

If a recognized professional standard of care is established, then that standard will generally provide the minimal legal duty. In this respect, if, for example, the Corps of Engineers' probable maximum flood (PMF) spillway requirements are viewed as the appropriate standard for high-hazard dams, then that standard will control the legal outcome in that failure to meet the PMF requirements would ordinarily result in liability. Note that this rule of tort liability does not

mandate in a legislative or regulatory way that the dam be designed and maintained to pass the probable maximum flood. What it means though is that the risk of legal liability will be substantial if the dam collapses for failure to pass the PMF. Similarly, failure to adhere to a statutory/regulatory provision will generally lead to legal liability.

Parenthetically, it should be noted that the question is not whether a similar event has occurred before, but the foreseeability of the risk that this particular mishap will occur. Even if a dam has not failed in the past under similar circumstances, liability may still exist if reasonable design, construction, operation, inspection, or maintenance procedures should have anticipated and prevented the dam failure. Thus, the dam builder and owner is required to foresee such floods as a reasonably prudent person, acquainted with all the surrounding circumstances, would anticipate. Anderson v. Rucker Brothers, 186 P. 293, 294 (Wash. 1919). Factors to be considered include the nature and habits of the stream, the features of the surrounding country, the snow and rain falls, and other conditions likely to cause freshets. Anderson v. Rucker Brothers, 183 P. 71, 72 (Wash. 1919).

Reasonable foreseeability also includes designing a structure in such a way that it will not be rendered unsafe because of the foreseeable actions of a third party, such as through inadequate maintenance. However, liability will not ensue simply because the subsequent negligence of a third party is conceivable, or "remotely possible," but only in those situations where the subsequent negligence is reasonably probable. Mathis v. United Engineers & Constructors, Inc., 554 A.2d 96, 100 (Pa. Super. 1989).

5. Inspection and Maintenance

Negligence can apply to the design, construction, operation, or maintenance of a dam. It may also consist of failing to inspect a dam, or negligence in the actual inspection of the facility.

Negligence thus consists either of a failure to act in the first instance, or, if one has in fact acted, the failure to act in a reasonable manner. Since dam failures do not usually occur without warning, there will normally be ample clues, signs, and warnings of impending failure if people are looking for them. Inspections are therefore a critical means of averting dam failures.

A classic case is Curtis v. Dewey, 93 Idaho 847, 475 P.2d 808 (1970), where defendants had boarded up the spillway of their dam, neglected to maintain the toe of the dam properly, and waited until back waters were almost overspilling the top of the dam before opening the headgates. In addition, they received warning at least one day prior to the failure that the dam's condition was critical. The breach occurred during the one hundred year flood. It was held plaintiffs established a prima facie case of negligence.

A similar example is Hayashi v. Alameda County Flood Control & Water Conservation District, 343 P.2d 1048 (Cal. Ct. App. 1959), where a 60-foot break in a levee occurred. Large particles of debris, such as logs, stumps and brush had collected in the stream near the break obstructing its flow. Plaintiffs warned defendants on January 5, 1956 and on other occasions of the break and potential dangers. No repairs were made. On January 15, 1956 and January 26, 1956, large quantities of water carrying debris flowed onto plaintiff's land. The court held plaintiff was under a duty to repair after notice; that is, "the party erecting... [the levee] is under a duty to maintain it in such a condition as not to cause injury because of negligent maintenance." *Id.* at 1051. The court felt sufficient time existed to repair the damaged levee. Pursuant to the common law, a landowner is responsible for changes caused by the negligent disrepair of an artificial structure. *Id.* at 1052, citing A.L.I., RESTATEMENT (SECOND) OF TORTS § 365.

Similarly, negligence in maintenance can be shown by repeated warnings and long knowledge of streams of water seeping out of a dam. In addition, the outflow increased in the

period shortly before the dam's failure. Bowling v. City of Oxford, 267 N.C. 552, 148 S.E. 2d 624 (1966).

An especially egregious example of at least negligence, if not wanton and wilful misconduct by today's standards, occurred in Carlson v. A & P Corrugated Box Corp., 364 Pa. 216, 72 A.2d 290 (1950). State officials informed the dam owner the structure was unsafe and would probably fail in a flood. The timber crib in the center of the dam had badly decayed in the 30 years since installation, the dam had settled, numerous leakages existed, and the spillway was inadequate. Defendant's officers promised to make the dam safe, and to breach the spillway to within 4 feet of the upstream level. In fact, no action was taken and the dam subsequently failed. If such a scenario occurs today, the defendants would be holding themselves open to punitive damages.

The purchaser of an unsafe dam is liable for damages if he fails to make it safe or maintain it. Town of Monroe v. Connecticut River Lumber Co., 68 N.H. 89, 39 A. 1019 (1984). In such a situation liability might be imposed even if the new owner did not discover the safety problem if a reasonable inspection should have discovered the problem. Richland County v. Anderson, 129 Mont. 559, 291 P.2d 267 (1955). Thus, if the owner knew, or reasonably should have known of the defective condition, liability will ensue. Dye v. Burdick, 262 Ark. 124, 553 S.W.2d, 833 (1977).

Liability on the part of a dam inspector could be based upon one of two theories: (1) failure to inspect the site, or (2) negligence in the actual inspection of the site. The gist of either theory is that a timely, competent inspection would have discovered the problem(s) in time to prevent the ensuing disaster.

An illustrative case in the analogous situation of bridge inspections is Ingram v. Howard-Needles-Tammen & Bergendorf, 234 Kan. 289, 672 P.2d 1083 (1983). The Kansas Turnpike Authority contracted out the annual safety inspections of its turnpike bridges to a firm of consulting engineers. The deceased, while driving a truck across a bridge, struck a 4' by 5'4" hole on the bridge caused by deck deterioration in its final stages. The truck swerved, hit the guardrail, and fell 25-30' to the ground, killing the driver. Defendants had performed annual safety inspections on the turnpike bridges since 1957, filing a report on their findings after each inspection. The bridge in question was inspected in 1978, with an inspection report dated October 25, 1978 being submitted to the Authority. The fatal accident occurred on February 20, 1979, less than a year after the inspection.

The Supreme Court of Kansas upheld a verdict of $710,000 against the consulting engineers and the Turnpike Authority, holding the engineers "had a legal duty to exercise reasonable care in conducting an annual safety inspection which it owed to the decedent -- and to other members of the traveling public," *Id.* at 292-3, 672 P.2d at 1086. This duty extends to the public even though the engineering firm was hired by the Authority as part of its trust agreement with the bondholders.

Defendants did not help their case by stating in the introduction to the annual safety inspection reports that the entire turnpike has been given a close and complete inspection by its consulting engineers and architects with particular attention being given "to items which might impose a hazard to public safety or result in increased future maintenance if not promptly corrected." In a published report it was stated that while the safety of the bridges may not be readily apparent to the turnpike patron, "The safety of the structures is apparent, however, to the structural engineers who regularly perform the annual inspection." *Id.* at 293-4, 672 P.2d at 1087.

It should be noted inferentially that while such statements help publicize the engineering firm and create "goodwill" for it, the words used could be construed as a form of representation amounting to a guarantee or warranty.

Factually, as a defense, the engineers claimed all they were required to perform was a visual inspection. Expert testimony for the plaintiffs successfully established that the professional standard of care encompassed much more than a visual inspection. It also seems that the actual inspection of the 345 bridges and all other facilities was made by two engineers in a period of approximately five days. Earlier reports on the bridge in question noted severe deterioration from 1964 to 1974 with no major repairs being undertaken.

Inspectors should fully detail their observations, in writing, to the client. It is the client's determination, as with a patient receiving advice from a physician, as to the course of action to be pursued. The inspector's duty is to fully disclose the deficiencies with recommendations to the client. The purpose of providing full documentation to the client is to limit the inspector's liability against claims both by injured third parties and the client who could otherwise claim "he wasn't told."

It is impossible in an engineering sense to guarantee a structure will never fail. Yet, an owner of even relatively small dams, such as a homeowner association, can take several simple steps to minimize the risk. These measures consist of education, monitoring and review. Education consists of instructing employees and members in danger signs to look out for, and safety measures to be implemented. The purpose is not, of course, to convert lay people into expert engineers, but rather to utilize simple visual observations for clues of underlying structural problems, as well as to notice anything unusual. Experts can subsequently assess any problems discovered during the routine observations. Easily observable phenomena include:

Animal burrows and trails
Cave-ins
Concrete disintegration at the top of the dam and elsewhere
Cracks and cracking
Damage to instruments
Dips in the crown of the dam
Discoloration
Displacement, such as rip-rap, erosion and bald spots
Misalignment
Rodent holes
Ruts
Sand boils
Seepage
Settlement or displacement
Sink-holes
Swirls or funnels around the spillway
Trees and bushes growing on the dam
Use of the dam by ATV's and other off-road vehicles
Whirlpools

These precautions constitute a continuous process as long as the dam stores water. Indeed, anything unusual, or any changes, should be observed and checked.

Monitoring consists of periodic, perhaps daily, site checks. Review consists of periodically reviewing and updating the educational and monitoring steps, as well as determining if changes in downstream development necessitate modifications in the dam's operation and physical structure.

A regular operation and maintenance program should be implemented, including preparation of an operations manual. The operator must be aware of the rules imposed by outside sources, including statutory, regulatory and licensing. Routine maintenance and periodic professional inspections are essential. A detailed schedule should be laid out and followed. Special maintenance items should be specially noted. Warning and evacuation plans should be worked out for downstream areas at risk if a structure fails. These plans should be periodically

reviewed, tested, and updated. Critical personnel and telephone numbers should be kept up to date.

It is also critical that thorough records be maintained of the structure, including routine inspection reports. Any problems reported should be documented with the appropriate resolution of the problem. Thorough documentation will not, by any means, preclude legal liability, but it should help in minimizing damages by demonstrating good faith and reasonable conduct.

6. Operations During a Flood

A special situation occurs when floodwaters pass through or over a dam, flooding out downstream residents. The general rule in this country is that the operator of a dam may permit floodwaters to pass over the dam in an amount equal to the inflow, but will be liable if any excess amount is discharged. The basic premise behind the rule is that a downstream plaintiff would have been damaged in any event by the flood, so he should not be allowed to recover damages simply because of the "fortuitous" fact that a dam was built with insufficient capacity to capture the flood. It should be pointed out that simply passing on a storm's inflow can cause devastating downstream damage in the case of a major storm or flood. However, it is assumed that defendant's acts did not in fact cause plaintiff's injuries since the damage would have occurred irrespective of the dam's existence. Bradford v. Stanley, 328 So.2d 328, 330 (Ala. 1978); City of Piqua v. Morris, 98 Ohio St. 42, 120 N.E. 300 (1918). Such a result can occur when a storm is of such intensity, as were Hurricanes Connie and Diane in Connecticut in 1955, that the plaintiff would have been washed away regardless of a dam's existence. No legal liability arises because there is no causation in fact. Krupa v. Farmington River Power Co., 147 Conn. 153, 157 A.2d 914 (1959). A similar result will occur when the operator may have been negligent in maintaining

the dam but the storm was of such force that the dam would not have held even with perfect maintenance. Bratton v. Rudnick, 283 Mass. 556, 186 N.E. 669 (1933).

Consequently, no duty generally exists on the part of a dam owner to operate the dam as a flood control mechanism for the benefit of lower riparian interests. Any cause of action must be based upon the negligent release of excessive water. The dam owner is essentially free to pass on the natural flow of the stream. See, e.g., Baldwin Processing Co. v. Georgia Power Co., 112 Ga. App. 92, 143 S.E.2d 761 (1965), Ireland v. Henrylyn Irr. Dist., 113 Colo. 555, 160 P.2d 364 (1945), Rockford Paper Mills, Inc. v. City of Rockford, 311 Mich. 100, 18 N.W.2d 379 (1945); Trout Brook Co. v. Willow River Power Co., 267 N.W. 302 (Wisc. 1936); Crawford v. Cobbs & Mitchell Co., 253 P. 3 (Ore 1927).

Conversely, liability is incurred when a greater flow of water is released than is naturally flowing in the stream. Beauton v. Connecticut Light & Power Co., 125 Conn. 76, 3 A.2d 319 (1938); Graham v. City of Springfield, 23 Ill. App. 3d 427, 319 N.E.2d 252 (1974). This liability is especially true when "foreign" waters are being diverted into the reservoir. Smith v. East Bay Municipal Utility District, 265 P.2d 610 (Cal. Ct. App. 1954); Trout Brook Co. v. Willow River Power Co., 221 Wisc. 616, 267 N.W. 302 (1936). Liability can thus exist for altering the natural flow of the stream. Gutierrez v. Rio Rancho Estates, Inc., 93 N. Mex. 755, 605 P.2d 1154 (1980).

Some authority also exists, based upon the general duty of foreseeability of risk, that the operator of a dam has a duty to draw down a reservoir when heavy runoff is expected. In Bruton v. Carolina Power & Light Co., 217 N.C. 1., 6 S.E.2d 822 (1940), the North Carolina Supreme Court held a power company was required to use ordinary care in anticipating flood conditions from an ordinary freshet as might be reasonably expected or foreseen, and to use reasonable care in the manipulation thereof and in guarding against any undue acceleration or retardation of the

flood water. *Id.* at 9, 6 S.E.2d at 828. In this case though, defendant prevailed because its charts disclosed it began to release the water before it had completely reached the crest of the dam, and controlled the discharge such that the reservoir was maintained at approximately the same level until the water level below the dam receded within the banks of the river. See also, Kunz v. Utah Power & Light Co., 526 P.2d 599 (9th Cir. 1975). In this case the discharge did not exceed the natural flow of the stream. However, the operator had in the past skimmed the crest off spring floods, thereby inducing a reliance expectancy on the part of downstream farmers, who converted their crops from those that would survive flooding to those that would be damaged by flooding. In another case, People v. City of Los Angeles, 34 Cal.2d 695, 698, 214 P.2d 1, 3 (1950), the court stated that completing a new dam did not increase the dam owner's obligations "unless the city operated the dam long enough and in such a manner that lower owners could reasonably rely on the continuance of that operation."

Similarly, in a non-dam case, Salt River Valley Water Users Association v. Giglio, 113 Ariz. 190, 199, 549 P.2d 162, 171 (1976), the court allowed recovery to homeowners who purchased homes in a floodplain. They successfully claimed that defendant's irrigation canal had inadequate spillways and, thus, caused flooding. An unusual rainfall approximated the 100-year flood. Liability was found even through the canal was not operated as a flood control device. Once the floodwaters entered the canal system, the association was under a duty to exercise reasonable care in disposing of that water.

As an added caveat, even if the operator is legally free to pass on the natural flow, courts may impose a duty to warn the downstream occupants of the high volumes of water that will be released. See, e.g., Chrysler Corp. v. Dallas Power & Light Co., 552 S.W.2d 742 (Tex. Ct. Civ. App. 1975); Ford Motor Co. v. Dallas Power & Light Co., 499 F.2d 400 (5th Cir. 1974).

B. STRICT LIABILITY

For our purposes, the major, alternative legal theory of relief to negligence is strict liability. If this approach is used, we realistically do not concern ourselves with the degree of care exercised by defendant, or the reasonableness of his conduct. Strict liability essentially imposes liability as a risk or cost of doing business. This theory primarily concerns itself with the liability of the owner or operator of the facility as compared to the engineer or contractor who, as we saw earlier, is generally held to a negligence standard.

Strict liability is derived from the old English case of Rylands v. Fletcher, L.R. 3 Eng. IR. App. Cas 330 (1868), where defendants constructed a reservoir on adjacent land in Lancashire with the owner's permission. Abandoned mine shafts underlaid the area, which is similar to the Scranton, Pennsylvania, region of the United States. Upon partial filling by defendants, the shafts gave way under pressure, causing water to flow through defendants' workings, into plaintiff's, destroying them in the process.

The court ruled for plaintiffs, holding that when one brings onto his land, and collects and keeps there anything likely to do mischief if it escapes, and it is a nonnatural use of the land, he must keep it at his peril. If not, he is prima facie answerable for all the damages that are the natural consequences of its escape. As developed by the British courts, the rule is that the defendant is liable when he damages another by a thing or activity unduly dangerous and inappropriate to the place where it is maintained, in the light of the character of the place and its surroundings.

While Rylands v. Fletcher certainly represents a highly unusual, "Rube Goldberg" scenario, a similar situation occurred in Minnesota a few years later. Defendants excavated a tunnel from their land on an island extending under the bed of the Mississippi River. The water in

the river broke through the roof of the tunnel and undermined plaintiff's land. The court followed Rylands v. Fletcher in invoking liability. Cahill v. Eastman, 18 Minn. 324, 10 Am. Rep. 184 (1871). See also, Williams v. Jader Fuel Co., Inc., 944 F.2d 1388 (7th Cir. 1991).

Rylands v. Fletcher initially met a lukewarm reception in the United States but has now become generally accepted. Critical in the early rejection of Rylands v. Fletcher was the belief that the doctrine would have hindered an expanding civilization and industrialization. However, social values have changed over the past century. Today we have a fault system of liability, which is partially based upon the entrepreneurial risk of doing business. We also place more emphasis on victim compensation today and less on the economic needs of the defendant.

The concept of strict liability has been widely extended to activities considered abnormally dangerous or ultra hazardous. The basis of strict liability for ultra hazardous activities is the risk of harm and the potential magnitude of that harm should the risk materialize. In such a situation, liability does not depend upon such factors as intent, recklessness, knowledge, negligence, moral blameworthiness, or any other degree of culpability. Nor does it depend on the degree of care that the defendant exercised or failed to exercise. Rather, liability is based simply upon the risks involved.

However, the application of strict liability has its limits. One generally accepted restriction is that strict liability is confined to those consequences which lie within the extraordinary risk created. Lee v. Mobil Oil Corp., 203 Kan. 72, 74, 452 P. 2d 857, 860 (1969). In this sense, the defendant is not an insurer for everything that might go wrong.

Recognized exceptions to strict liability include Acts of God, Sutliff v. Sweetwater Water Co., 182 Cal. 34, 186 P. 766 (1920); Golden v. Amory, 329 Mass. 484, 109 N.E.2d 131 (1952), acts of agencies of the state (e.g., war), and malicious acts of third parties (e.g., sabotage). See

e.g., Wheatland Irrigation District v. McGuire, 539 P.2d 1128 (Wy. 1975), where the dam's rupture was purportedly caused by sabotage. See also, Gutierrez v. Rio Rancho Estates, Inc., 94 N.M. 84, 87, 607 P.2d 625 (Ct. App. 1979), aff'd. on other grounds, 93 N.M. 755, 605 P.2d 1154 (1980); Wigal v. City of Parkersburg, 81 S.E. 554 (W. Va. 1914). Thus, courts have generally held that the owner of the reservoir cannot be held liable where the escape of water was caused by third party acts which the owner could neither control nor anticipate. Albig v. Municipal Authority of Westmoreland County, 502 A.2d 658 (Pa. Super. 1985); See also Cohen v. Brockton Sav. Bank, 320 Mass. 690, 71 N.E. 2d 109 (1947); Box v. Jubb, L.R.4. (Ex. Div.) 76 (1879).

For some courts, if the activity is one of common usage, that is, an activity customarily carried on by much of society, or by many people in the community, then strict liability is inappropriate. Certain activities, such as driving an automobile, are so widespread that it is considered inappropriate to subject the operator to strict liability, even though, as we all know, auto accidents occur daily with tragic consequences. Conversely, strict liability was imposed when a gasoline tanker exploded in flames after falling off an overpass. See Siegler v. Kuhlman, 81 Wash. 2d 448, 502 P.2d 1181 (1972).

Similarly, the normal or customary irrigation of farm land may not constitute an ultra hazardous activity carrying the risk of strict liability. See e.g. Clark v. Di Prima, 241 Cal.App.2d 823, 51 Cal Rptr. 49 (1966) (Case involved irrigation ditch-not a large dam.); Mackay v. Breeze, 72 Utah 305, 269 P. 1026 (1928) (Rylands v. Fletcher held inapplicable to water in irrigation ditches and canals.); Chicago & North Western Ry. Co. v. Tyler, 482 F.2d 1007 (8th Cir. 1973); Peter v. Talent Irrigation Dist., 258 Ore. 140, 482 P.2d 170 (1971). (Irrigation of orchard land in a dry area is not considered exceptional or unusual and the risk of serious harm created by the

activity is minimal such that Fletcher is inapplicable.) See also Wheatland Irr. Dist. v. McGuire, 537 P.2d 1128 (Wy. 1975).

While strict liability for ultra-hazardous activities has become widely accepted in the United States, its application to dam failures has been more limited. There are not many relevant cases. Most of the decisions are older and several are based on policy considerations. For example, Rylands v. Fletcher was rejected by Texas in a famous case involving the escape of salt water from ponds constructed to store runoff from oil wells. It was technologically impossible to produce oil without drawing up salt water. Under the circumstances, the Texas Supreme Court did not want to hinder the oil industry. Turner v. Big Lake Oil Co., 128 Tex. 155, 96 S.W.2d 221 (1936). See also, Barnum v. Handschieger, 103 Neb. 597-98, 173 N.W. 593, 594 (1919) where the court stated:

> It seems that the owner of a dam erected across a natural stream for the purpose of raising water for irrigation or power, or other useful purposes, in the event of damage from breaking, is liable only for negligent construction or maintenance. The Act of God is of course always a defense.

A slight majority of states reject strict liability in dam failures, including a relatively recent 1972 New Hampshire opinion. Moulton v. Groveland Paper Co., 289 A.2d (N.H. 1972). Two early cases in Connecticut and Vermont also rejected strict liability in dam failure situations. See Beautor v. Connecticut Light & Power Co., 125 Conn. 76, 3 A.2d 315 (1938) and Lapham v. Curtis, 5 Vt. 371 (1833), although these states have subsequently accepted the doctrine of strict liability. See Whitman Hotel Corp. v. Elliott & Watson Engineering Co., 137 Conn. 562, 79 A.2d 591 (1951) and Malloy v. Lane Construction Corp., 123 Vt. 500, 194 A.2d 398 (1963) (blasting case). A series of older cases in California also reject strict liability. See e.g. Sutliff v. Sweetwater Water Co., 182 Cal. 34, 186 P. 766 (1920). However, considering the extent to which

California has substantially expanded legal liability in recent years, the continued validity of these older cases is in doubt. See also Wheatland Irr. Dist. v. McGuire, 537 P.2d 1128 (Wy. 1975) (Wyoming case law involves irrigation ditches and not major dams); Bowling v. Town of Oxford, 267 N.Car. 552, 148 S.E.2d 624 (1966) (Liability only for negligence in the original construction or subsequent maintenance of the dam); Kunz v. Utah Power & Light Co., 117 Idaho 901, 792 P.2d 926 (1990) (liability only for negligence in the construction, maintenance or operation of the system).

In addition, Maine and New Hampshire reject the general doctrine of strict liability. See Reynolds v. W. H. Hinman Co., 145 Me. 343, 75 A.2d 802 (1950). New Hampshire has recently reemphasized its traditional disfavor of strict liability. Bagley v. Controlled Environment Corp., 503 A.2d 823 (N.H. 1986) (case involved the release of hazardous wastes by defendant on neighboring lands).

Conversely, recent Massachusetts and Florida opinions adopt the doctrine of strict liability in dam failure cases. See Clark-Aiken Co. v. Cromwell-Wright Co., 367 Mass. 70, 323 N.E.2d 876 (1975), and Cities Service Co. v. State of Florida, 312 So.2d 799, 801 (Fla. App. 1975). The Florida case involved the breach of a phosphate settling pond, causing one billion gallons of phosphate slime to escape, "killing countless numbers of fish and inflicting other damages." The court, in adopting Rylands v. Fletcher, set out policy grounds that are widely applicable today:

> In early days it was important to encourage persons to use their land by whatever means were available for the purpose of commercial and industrial development. In a frontier society there was little likelihood that a dangerous use of land could cause damage to one's neighbor. Today our life has become more complex. Many areas are overcrowded, and even the non-negligent use of one's land can cause extensive damages to a neighbor's property. Though there are still many

hazardous activities which are socially desirable, it now seems reasonable that they pay their own way. Society should not ask an innocent neighbor to bear the burden thrust upon him as a consequent of an abnormal use of the land next door. The doctrine of Rylands v. Fletcher was therefore applied in Florida.

The A.L.I. RESTATEMENT (SECOND) OF TORTS (1979) essentially adopts Rylands v. Fletcher in imposing liability for ultra hazardous activities, which necessarily involve a risk of serious harm to others, cannot be eliminated by the exercise of utmost care, and are not a matter of common usage. Factors to be considered include the high degree of risk, the potential gravity of harm should the risk materialize, the exercise of reasonable care, whether or not the activity is one of common usage, the appropriateness of the activity to the locality, and its value to the community *Id.* at § 520. A reading of the cases indicates that the major factor is the nature and extent of the risk. This analysis, particularly the emphasis on risk, proved critical in the previously mentioned Massachusetts case of Clark-Aiken Co. v. Cromwell-Wright Co., 367 Mass. 70, 89-90, 323 N.E.2d 876, 887 (1975).

A major policy consideration today for imposing strict liability upon landowners who undertake abnormally dangerous activities is the high risk of harm posed to others. These landowners should compensate the innocent victims for their injuries. See Doundoulakis v. Town of Hempstead, 42 N.Y.2d 440, 448, 368 N.E.2d 24, 27 (1977). By way of analogy in dam cases, the collection and storage of a large quantity of water on a hillside reservoir upstream from a residential community may well constitute an abnormally dangerous activity. The consequences of such a breach are likely to be catastrophic.

Strict liability has also been imposed in situations where defendant has constructed a dam, or part of a dam such as flash boards, expecting it to give way in a flood. In such a case, the

potential risk of downstream flooding is so great that liability is imposed. Thus, while the defendant is not an insurer of the safety of its dam, he must use ordinary care in its operation. A defendant cannot provide a device such as flashboards, with the intention that they shall give way in a flood, and then escape liability to those injured below the dam. Pursuant to an old rule of law, one must use his property so as not to injure his neighbors. Winchester Water Works Co. v. Holiday, 45 S.W.2d 9 (Ky.Ct.App. 1932). See also, Wargo v. Connecticut Light & Power Co., 127 Conn. 629, 18 A.2d 924 (1941). Such a practice today could be considered reckless conduct, thereby subjecting the operator to an award of punitive damages.

Occasionally a state will enact a statute that imposes strict liability in dam failures. For example, New Hampshire has a statute that makes it unlawful to have a "dam in disrepair." N. H. REV. STAT. ANN. §§ 482.42. Violation of the statute gives rise to civil liability. The New Hampshire Supreme Court stated:

> We are of the opinion and hold that RSA 482.42 provides a standard of conduct on the part of dam owners intended to protect against damage from the flooding of the land of others by their dam.

Moulton v. Groveland Paper Co., 289 A.2d 68, 70-71 (N.H. 1972). In this situation, the legal cause of action is technically negligence and not strict liability, but the result is effectively the same. A similar statute exists in Utah:

> The owner of any ditch, canal, flume or other watercourse shall maintain the same in repair so as to prevent waste of water or drainage to the property of others . . .

UTAH CODE ANN. § 73-1-8. However, this statute has been consistently interpreted to impose liability only for negligence, and not strict liability. See e.g. Mackay v. Breeze, 72 Utah 305, 269 P. 1026 (1928); Erickson v. Bennion, 28 Utah 2d 371, 503 P.2d 139 (1972).

C. "ACTS OF GOD" AND THE PROBABLE MAXIMUM FLOOD

A commonly asserted defense in dam failure cases is that the failure was caused by an "Act of God", i.e., an eventuality outside human contemplation, such as a catastrophic storm. If the storm is beyond human capacity to anticipate, then liability will not lie. See e.g. Golden v. Amory, 329 Mass. 484, 488, 109 N.E.2d 131, 133 (1952). See also Sutliff v. Sweetwater Water Co., 182 Cal. 34, 186 P. 76 (1920). Negligence simply does not exist. Charvoz v. Bonneville Irr. Dist., 235 P.2d 780, 783 (Utah 1951).

The Act of God defense generally entails the following requirements: unforeseeability by reasonable human intelligence and the absence of a human agency causing the alleged damage. Thus, if a similar storm had occurred before, could be anticipated using modern techniques, or were otherwise reasonably foreseeable, even if not probable, claiming an Act of God will not successfully serve as a defense.

As explained in Curtis v. Dewey, 93 Idaho 847, 849, 475 P.2d 808, 810 (1970), the "Act of God" defense is based on the premise that

> negligence cannot be predicated upon a failure to anticipate that which was so extraordinary and utterly unprecedented as to have eluded the foresight of a reasonable man. If, therefore, a person builds a dam embankment on or beside a waterway sufficient to withstand the maximum flow of water which might be expected, and his structure is destroyed by a flow which would not have been anticipated by a reasonably prudent man, then the resulting flood would be considered such an extraordinary flow of water as to amount to an "Act of God" and that person would not be negligent and not liable for damages caused by the flood.

A modern case, citing an earlier 1916 opinion, laid out these factors in analyzing the Act of God defense:

> On passing upon what is or what is not an extraordinary flood or whether it should have been anticipated and provided against, the question to be decided is: 'Considering the rains of the past, the

> topographical and climatic conditions of the region and the nature of the drainage basin as to the perviousness of the soil, the presence or absence of trees or herbage which would tend to increase or prevent the rapid running off of the water, would or should a reasonably prudent man have foreseen the danger and provided against it?'

Frank v. County of Mercer, 186 N.W.2d 439, 443 (N. Dak. 1971), quoting from Soules v. Northern Pac. Ry. Co., 157 N.W. 823, 824 (N. Dak. 1916). As stated in a picturesque, old English case, a landowner in constructing a reservoir "is bound to provide against the ordinary operation of nature but not against her miracles." Greenock Corp. v. Caledonian Railway, [1917] A.C. 556, 572. In a more recent case, the Alabama Supreme Court explained the standard as follows:

> In its legal sense an 'Act of God' applies only to events in nature so extraordinary that the history of climatic variations and other conditions in the particular locality affords no reasonable warning of them.

Bradford v. Stanley, 355 So.2d 328, 330 (Ala. 1978). The same standard appears in Kennedy v. Union Electric Co. of Missouri, 358 Mo. 504, 518, 216 S.W. 2d 756, 763 (1948). In this case the rainfalls were not "so unprecedented that they could not have been anticipated" since higher average rainfalls had occurred 38 years earlier. *Id.* See also, Corrington v. Kalicak, 319 S.W.2d 888 (Mo. 1959).

It is not an Act of God when the rains are foreseeable based on normal climatic conditions, and any resulting harm could be prevented through the design of proper drainage channels. United States v. J.B. Stringfellow, Jr., 661 F. Supp. 1053, 1061 (C.D. Calif. 1987) (case involved toxic waste dump). As expressed elsewhere:

> Although a rainfall may be more than ordinary, yet if it be such as has occasionally occurred at irregular intervals, it is to be foreseen that it may occur again; and a party engaged in a public work, the construction of which involves the change or restraint of the flow of water in a natural channel, is guilty of negligence if it fails to make

> reasonable provision for the consequences that will result from such extraordinary rainfalls as experience shows are likely to recur.

Fairbury Brick Co. v. Chicago, R.1 & P.R. Co., 79 Neb. 854, 860, 113 N.W. 535, 537 (1907). Thus, if similar rainfalls or stream overflows have occurred in the past, an Act of God defense should fail.

In a sense major storms and earthquakes are random events, which may or may not strike a specific geographic area at an unknown time in the future. Some areas may escape unscathed from severe natural forces for millennia. Obviously though, designers of skyscrapers in Los Angeles and San Francisco should use design criteria to minimize the risk of collapse from earthquakes even if they never experience the major earthquake, "The Big One," that is a known seismic risk.

Consequently, the defense is generally limited to truly unforeseeable events, and not situations involving unusual, but not unprecedented rainfalls. See. e.g. Anderson v. Highland Lake Co., 258 S.W. 218 (Tex. Ct. Civ. App. 1924); Webb v. Platte Valley Public Power & Irr. Dist., 146 Neb. 61, 18 N.W.2d 563 (1945).

If, therefore, the injury, which the flood caused, might have been avoided or prevented by human prudence, foresight, and care reasonably to be expected from the defendant, but not exercised, liability exists. Perkins v. Vermont Hydro-Electric Corp., 177 A. 631 636, (1934); See also, Dougherty v. California-Pacific Utilities Co., 546 P.2d 880 (Utah 1976). In this respect, an Act of God defense will generally fail if the amount of rain falls within the probable maximum precipitation (PMP) or the floodwaters are within the probable maximum flood (PMF) ranges, even if such an event had not previously occurred in the area.

Failure of the Act of God defense will not automatically result in liability. Defendant would still have to be found negligent in light of the foreseeability of the risk. For example, only

so much protection can be afforded utility poles against hurricanes, which are foreseeable in much of the coastal United States. On the other hand, we do not reasonably expect utility poles to be knocked over by a mild gust of wind, or foreseeable snowfall. Bowman v. Columbia Telephone Co., 406 Pa. 455, 179 A.2d 197 (1962).

While the defense has been successfully asserted in some cases, see e.g., Frank v. County of Mercer, 186 N.W.2d 439 (N.D. 1971); Benavides v. Gonzalez, 396 S.W.2d 512 (Tex. Ct. Civ. App. 1965); Trout Brook Co. v. Willow River Power Co., 221 Wisc. 616, 267 N.W. 302 (1936); Bratton v. Rudnick, 186 N.E. 669 (Mass. 1933), it has received at best, a mixed reaction by courts in dam failure cases. For example, if the injury is caused in part by an Act of God, and in part by the negligent act of defendant, the defense fails. By way of illustration, a railroad had misshipped a passenger's trunk, which was lost in the infamous Johnstown Flood of 1889. The court viewed the tragic flood as an Act of God, but since the railroad was at fault in mishandling the luggage, it was held liable for the plaintiff's lost luggage. Wald v. Pittsburgh, C.C. and St. L.R. Co., 162 Ill. 545, 44 N.E. 888 (1896). See also, Dougherty v. California-Pacific Utilities Co., 546 P.2d, 880 (Utah 1976). Diamond Springs Lime Co. v. American River Constructors, 16 Cal. App. 3d 581, 94 Cal. Rptr. 200 (1971), Beauton v. Connecticut Light & Power Co., 125 Conn. 76, 3 A.2d 315 (1938); Perkins v. Vermont Hydro-Electric Corp., 106 Vt. 367, 177 A. 631 (1934). Dye v. Burdick, 262 Ark. 124, 138-39, 553 S.W.2d 833, 839 (1977) (Act of God must be sole proximate cause of the damage to plaintiffs with no negligence on the part of appellees contributing to the cause in any way); Charvoz v. Bonneville Irr. Dist., 235 P.2d 780 (Utah 1951).

However, if the Act of God is so overwhelming as of its own force to produce the injury independently of defendant's negligence, the defendant will not be liable. Perkins v. Vermont Hydro-Electric Corp., 177 A. 631, 636 (Vt 1934). There are two ways of viewing the situation. In

a sense, the Act of God either supersedes defendant's negligence, or defendant's negligent act was not a cause in fact of the incident. Defendant's act did not cause the damage since the injury would have occurred anyway.

Thus, if the superior force would have produced the damage on its own, there is no liability. However, if the defendant's negligence coincides with the natural cause, there is liability. For example, if a flood, caused by an Act of God, would not of its own have damaged the plaintiff's property, then defendant will be liable for all resulting damage to plaintiff caused by its dam failure, which added to the flood waters. There is no need to apportion damages in this situation since defendant's maintenance of the dam was in fact the sole cause of plaintiff's damages. Carlson v. A & P Corrugated Box Corp., 364 Pa. 216, 72 A. 2d 290 (1950). The burden is on the defendant of proving that the unprecedented flood would have produced the same result not withstanding the release of any additional waters. Oklahoma City v. Tarkington, 63 P.2d 689, 691 (Okla. 1936).

Whether or not a flood is so extraordinary and unprecedented as to constitute an "Act of God" is normally a question of fact for the jury. Lee v. Mobil Oil Corp., 203 Kan. 72, 452 P.2d 857 (1964); Ferderer v. Northern Pacific Ry. Co., 77 N. Dak. 169, 42 N.W.2d 216 (1950).

A classic Colorado case illustrates the weakness of the Act of God defense, and sheds some light on the current debate over the Corps of Engineers PMF requirements. In Barr v. Game, Fish & Parks Commission, 497 P.2d 340 (Colo. Ct. App. 1972), design plans called for a spillway capacity of 33,000 cubic feet per second (cfs). The actual spillway constructed had a 4,500 cfs capacity. The probable maximum flood was 200,000 cfs, although the previously known high flow of water was 27,500 cfs. The peak of the flood that occurred was 158,000 cfs with an estimated 75,000-100,000 cfs passing over the top of the dam. Defendants claimed Act of

God. The court rejected this defense, holding that the defendants were negligent in designing an inadequate spillway. Since the flow of water was reasonably foreseeable, there was no Act of God. The foreseeability of the risk, that is, the probable maximum flood, was the key to liability.

Similarly, an Act of God defense is not going to win when the defendant has boarded up the spillway, neglected to maintain the toe of the dam properly, waited until the back waters were almost running over the top of the dam before opening the headgates, and had received a warning at least one day prior to the breaking of the dam that its condition was critical. Such conduct amply justifies a jury verdict that the defendant has negligently operated a dam. See Curtis v. Dewey, 93 Idaho 847, 849, 475 P.2d 808, 810 (1970). To the same extent is a New Mexico case where the operator let sand and silt accumulate and failed to open a check gate. Little v. Price, 74 N. Mex. 626, 397 P.2d 15 (1964).

In this respect, it is critical to note that while high levels of precipitation may, as a factual matter, be a force of nature, i.e., an Act of God, inadequate design, construction or maintenance are Acts of Man, and will be adjudicated as such. The designer needs to consider not only the PMP, but also successive storms, downstream flooding and debris flows in calculating the PMF.

To summarize, the Act of God defense thus generally fails if the event should reasonably have been anticipated in light of past knowledge, or if antecedent negligence on the part of the defendant exacerbates the situation. While the past is prologue with respect to actually occurring events, foreseeability is based not only upon the historical past, but also upon that which modern technology and science allows us to project into the future.

D. THE RISKS OF COMPLYING WITH MINIMAL GOVERNMENT OR PROFESSIONAL STANDARDS

As we saw earlier, professionals will be liable for failing to comply with statutory and regulatory requirements. However, compliance with such a standard does not preclude legal

liability. It is clear that compliance with a generally accepted industry or professional standard of care, or with government regulations, establishes only the minimal standard of care. Courts may assess a higher standard of care, utilizing the "reasonable person" standard and foreseeability of risk as the criteria. Judicial rejection of the governmental or professional is not routine, but it does occur often enough to transcend the unusual. It is fair to say that persons, who rely blindly upon a governmental or professional standard of care, pose great danger to others, and present a legal risk to themselves, when they know or reasonably should know that reasonable prudence requires higher care. Thus, the industry custom may itself be held "negligent."

The most famous case in this respect is another Judge Learned Hand opinion, The T. J. Hooper, 60 F.2d 737 (2d Cir. 1932). The case involved a lawsuit by the owner of two barges lost in a storm. The tug company argued it was not liable in failing to equip the tug boats with radio receiving sets. The contention was premised on the general custom among coastwise carriers at the time not to equip tugs with radio receivers. Had the tug been so equipped, the captain would have received timely warning of the approaching storm and presumably would have, through the exercise of good prudence, stayed in port. The opinion noted "an adequate receiving set . . . can now be got at small cost and is reasonably reliable if kept up; obviously it is a source of great protection to their tows." *Id.* at 729.

In rejecting the defense of compliance with a generally accepted industry standard, Judge Hand wrote:

> Is it then a final answer that the business had not yet generally adopted receiving sets? There are, no doubt, cases where courts seem to make the general practice of the calling the standard of proper diligence . . . Indeed in most cases reasonable prudence is in fact common prudence; but strictly it is never its measure; a whole calling may have unduly lagged in the adoption of new and available devices . . . Courts must in the end say what is required;

> there are precautions so imperative that even their universal disregard will not excuse their omission.

Id. at 730.

More recently the Washington Supreme Court reached a similar result in Helling v. Carey, 84 Wash.2d 514, 519 P.2d 981 (1974). Plaintiff was periodically treated for eye problems by defendant ophthalmologist. However, she was not checked for glaucoma because no symptoms manifested themselves. The worldwide standard of the profession was not to routinely test patients under the age of 40 for glaucoma absent specific symptoms. The reason for this standard of care was that the incidence of glaucoma was exceedingly low for patients under the age of 40 (the rate is 1/25,000). As it turned out, plaintiff, who was 32, suffered from glaucoma, with a sustained loss of vision.

The Court held for plaintiff, in effect holding that the universal standard of care was deficient. The opinion was based on several factors: the simplicity and reliability of the test, the lack of judgment required of the professional in reading the test results, the safety of the test and the relative inexpensiveness of it. The Court proceeded to cite Justice Hand's remarks in The T. J. Hooper that Courts must in the end determine what is required.

Thus, as stated elsewhere, "Evidence of custom in the trade may be admitted on the issue of the standard of care, but is not conclusive." Coburn v. Lenox Homes, Inc., 186 Conn. 370, 381, 441 A.2d 620, 626 (1982).

A good example of where compliance with a governmental standard was inadequate to preclude legal liability is Gryc v. Dayton Hudson Corp., 197 N.W.2d 727 (Minn. 1980). A 4-year old girl received severe burns upon her upper body. She was wearing pajamas made of untreated cotton. The material met the federal standards of product flammability. Plaintiff established at trial that (1) the government standards were clearly inadequate at the time of the accident, (2) the

apparel manufacturers were vigorously fighting any change in the government standards, (3) durable flame retardant chemicals, that would have significantly increased the safety of the product, were commercially available, and (4) the defendant was aware of these facts. Consequently, it was found that the defendant acted in a reckless, wanton, and/or malicious disregard of the rights of others in marketing the fabric. The verdict of $750,000 compensatory and $1,000,000 punitive damages was therefore affirmed on appeal.

Similar results were reached in Raymond v. Riegel Textile Corp., 484 F.2d 1025 (1st Cir. 1973) (standard promulgated under the "Flammable Fabrics Act" was outdated); Burch v. Amsterdam Corp., 366 A.2d 1079 (D.C. Cir. 1976) (when manufacturer knows of greater dangers not included in statutorily mandated warning, it should warn the product users of the dangers and precautions). A federal court in Kansas recently reaffirmed this approach. See Alvarado v. J.C. Penney Co., Inc., 735 F. Supp. 371, 374 (D. Kan. 1990) (plaintiff can attempt to demonstrate by a preponderance of the evidence that a regulatory or administrative standard does not meet the necessary level of safety); see also, Contini v. Hyundai Motor Co., 840 F. Supp. 22 (S.D.N.Y. 1993).

While many of the cases appear clear-cut on their face, they are not always so. The critical fact is that the courts retain the power to override professional or industry standards as inadequate. The reality is that judges and juries may find that the avoidable tragedies warrant compensation from the "wrongdoers." Thus, compliance with minimal, or non-existent government regulations or professional standards, may not protect the owner/operator if reasonable prudence would justify a higher standard of care.

By way of example, many states do not require emergency action plans. Failure to prepare such a plan though could risk substantial liability if a tragedy results which could have been

averted. In this respect, the professional standard may impose a greater duty than some states require. Time will often be of the essence in minimizing the risk to downstream populations in cases of imminent or actual dam failures. The existence of a viable emergency action plan, which has been periodically tested and updated, can well reduce the threat to the downstream population even if the dam cannot be saved. Indeed, failing to plan can be construed as planning to fail. If we think in terms of Judge Learned Hand's factors for negligence analysis, the ease of preparing, and periodically updating, a plan outweighs the risk of not doing it. It is also important to note that the American Society of Civil Engineers recommends preparation of an emergency action plan.

E. THE RISKS INHERENT IN DESIGN TRADE-OFFS

While in some sense there must always be a trade-off between safety, performance (efficiency), and cost (economics), the practical reality is that, in the eyes of a jury mesmerized by a skillful attorney, trade-offs will often seem callous when balanced against the lives lost or severe injuries incurred as a result of the decision. The exercise of discretion on the part of the designer or operator may well appear to constitute a "reckless disregard" of the rights of the victim, since the injury was foreseeable.

Some judgement calls appear blatantly wrong in hindsight and can give rise to substantial litigation. The classic example is of the Ford Pinto. Ford's engineers discovered during crash tests that the Pinto's gas tank had a substantial risk of exploding in rear-end collisions. They also recognized that occupants of a Pinto, who would otherwise have survived the accident, could die in such an accident because of the fiery explosion. Installation of a $10 part would have minimized the risk of resulting explosions, but Ford's management vetoed the addition. A California jury was shocked when it heard evidence that Ford weighed a $10 part greater than

human lives. The ensuing verdict was $125 million, which was subsequently reduced to $3.5 million. See Grimshaw v. Ford Motor Co., 119 Cal. App. 3d 757, 174 Cal Rptr. 348 (1981).

Even close cases can go against the defendant though. A good example is Dawson v. Chrysler Corp., 630 F.2d 950 (3rd Cir. 1980). Plaintiff, a police officer, was rendered a quadriplegic when he lost control of his police car on a rain-slicked road and crashed into a telephone pole. The car struck the pole in a backward direction at a 45 degree angle on the left side of the vehicle. Point of impact was the left rear wheel well. The vehicle literally wrapped itself around the pole. The pole ripped through the body of the car and crushed plaintiff between the seat and the "header" area of the roof. Plaintiff claimed the vehicle was defective because it did not have a full, continuous steel frame extending through the door panels, and a cross member running through the floor board between the posts located between the front and rear doors of the vehicle. Plaintiff alleged that with such a design the car would have bounced off the pole with little injury to plaintiff, who incidentally was not using his seat belt.

Plaintiff successfully recovered a verdict of $2,064,863.19 in spite of Chrysler's evidence that the vehicle met all federal requirements, and that plaintiff's design theory would create a greater risk of injury in most auto accidents. The Chrysler design in question absorbed the impact of most crashes like an accordion, and decreased the rate of deceleration on the occupants of the vehicle. In addition, plaintiff's design would add between 200 and 300 pounds to the weight of the vehicle, and about $300 to the price of the vehicle. Yet plaintiff won. The reason is obvious. It has to do with the risks of defendant going to trial with a severely injured victim for whom the jury understandably feels sympathy.

Dawson v. Chrysler Corp. is significant in another respect. In dam safety analysis we are frequently dealing with incremental damage that can be averted with varying design modifications

and regimes, recognizing that there is no 100% safe design. Dawson is a case where defendant designed the vehicle to reduce the risk in the riskiest type of auto accident, a head-on collision. To have chosen plaintiff's design would have resulted in a greater risk of death or serious bodily injury to a larger number of persons, as well as increased gasoline consumption and a higher cost to purchasers, which factors would adversely affect society at large.

For the courts and the jury, the specific risks posed to plaintiff through defendant's design outweighed the increased costs to society necessitated by plaintiff's design proposal. The law, through the mechanism of litigation, tends to focus narrowly on the rights and liabilities of the parties before it. In such a situation the jury understandably has compassion for a severely injured victim. The judges on the appellate tribunals are also only human, and can be expected to feel sympathetic to the innocent victim. Thus, the question all too often becomes what could defendant have done to reduce the risk presented to this victim, and not what could defendant have done to reduce the risk to society in general.

Sometimes though a design trade-off will be accepted. For example, in Wright v. United States, 568 F. 2d 153 (1977), a highway bridge was designed for a 25-year design frequency flood, which the state highway department felt was all they could justify expending, taking into account the expected traffic on the road. The approach road washed away in a storm that could be expected to occur only once every 42 or 55 years. Unable to traverse the washed-out road, a car went out of control with the two occupants dying. No liability was found against the federal government which built the bridge, based upon a design of the state of Utah, which also assumed maintenance of the bridge upon completion.

III. CAUSATION

One of the key requirements of establishing liability on the part of a defendant is causation; that is, showing that the defendant's wrongful act resulted in the victim's injuries. Plaintiff must prove with reasonable certainty that the damages complained of resulted from defendant's acts or omissions. In other words, defendant's misdeed must have caused plaintiff's injury. Plaintiff has the burden of proof on this element of liability as with the other requirements of establishing a cause of action. Such proof need not be made with absolute certainty though. In cases involving conflicts in evidence (which is usually the situation), it is for the jury to weigh the evidence and reach determinations of fact. See e.g. English Village v. Boettcher and Lieurance Construction Co., Inc., 640 P.2d 1282, 1285 (Kan.App. 1982).

An older case held that once plaintiff establishes the breaking of a dam, and resulting injury, the plaintiff has made out a prima facie case. The burden then shifts to defendant to show the dam was not negligently constructed or maintained. The owner should be required to show the exercise of a degree of care commensurate with the injury that might occur in the event the dam should break. Barnum v. Handschiegel, 103 Neb. 594, 598, 173 N.W. 593, 594 (1919).

In many instances, plaintiff will be able to establish precisely what went wrong. For example, upon completion of the Teton Dam Collapse investigations, a clear picture of the disaster emerged. Specific causation was established. Such will often be the situation with a major engineering disaster, resulting in a tragic loss of life. These detailed investigations may not occur though with "lesser" incidents.

Even when direct evidence of the "cause" of the break is lacking, circumstantial evidence may carry the case for the plaintiff. For example, evidence in one case showed that for a long period of time prior to the dam's collapse, a sizable stream of water was running from a point at

which the foot of the earthen dam rested upon the abutting hillside and that water was seeping through the dam in the vicinity of the drain pipe. For two days prior to the collapse of the dam, the volume of water flowing away from the foot of it was increasing and of a muddy color. In addition, a month prior to collapse the owner was notified by the superintendent of a highway construction crew that water in sufficient volume to fill to half capacity two 24 inch culverts was flowing away from the foot of the dam and that its source was neither an escape of water through the valve of the drain pipe nor recent rainfall, The court had no problem under these facts in letting the issue of negligence go to jury. Bowling v. City of Oxford, 267 N.C. 552, 148 S.E.2d 624 (1966). Under these circumstances, negligence on the part of the dam owner is clear even if the technical cause of the accident remains unknown.

Usually expert technology will be needed to establish the proof of fault on the part of defendant. However, there may be circumstances in which non-expert testimony can be used to establish the requisite standard of care based upon common sense observations of the terrain, or other factors. See e.g., Knight v. Utah Power & Light Co., 209 P.2d 221, 224 (Utah 1949). See also, Milton J. Womack, Inc. v. House of Representatives, 509 So.2d 62, 66 (La. Ct. App.); writs denied, 513 So. 2d 1208, 1211 (La. 1987), an architect malpractice case, where the court stated: "When the matter in question is one that can typically be understood without assistance from an expert, when a lay person can infer negligence, then expert testimony is not required."

However, it will be especially difficult without expert testimony to convince a court of that which appears impossible. By way of illustration, in a case involving alleged overflowing by backwaters, plaintiffs' lands were eight feet above the river water level. The court noted this contention "would be contrary to natural laws and forces because unconfined water cannot run

uphill and the water entering the creek from the river could not rise higher than its elevation in the river." Crisafulli v. State, 41 App. Div. 2d 695, 343 N.Y.S. 2d 138, 140 (1973).

Expert testimony might well be required not only on the issue of causation of the dam break, but also to determine the extent of damages caused by the break. In this respect, it might be necessary to distinguish between the damages that would have occurred anyway during a storm due to precipitation and flooding, and the incremental flooding caused by the dam break. A Canadian case, for example, stands for the proposition that defendants are only liable for the "excess" of the flooding. Johnson & Johnson v. Dundas, 4 D.L.R. 624, 638 (Ont. 1945). Such evidence may, of course, be presented by experts using hydrographs. See e.g., Ansley v. Tarrant County Water Control & Improvement Dist. No. 1, 498 S.W.2d 469 (Tex. Ct. Civ. App. 1973). (This case involved periodic flooding and not a dam break.)

In one case plaintiffs used as a witness the testimony of a workman who laid a new pipe into a mine lake reservoir as part of a water supply system. His testimony clearly established that he was well conversant with soil conditions and structural stability at the site where the dam failed. However, it may be that plaintiffs did not need expert testimony to establish their case since it was clear, partially through the witness' testimony, that the "dam," or retaining wall, consisted of mud, sticks, wire and other improper materials. It should be no surprise that a dam so constructed should suddenly break. See Shell v. Town of Evarts, 296 Ky. 602, 178 S.W.2d 32 (1944).

Many times though it will be impossible to establish precisely what went wrong, thereby leaving a gap in the victim's evidence. Such a weakness need not be fatal to plaintiff's case though because of the legal doctrine commonly known as *res ipsa loquitur*- "the thing speaks for itself." The origin of the doctrine will shed light on its meaning. In the 1847 case of Byrne v. Boadle, 2

H. & C. 722, 159 Eng. Rep. 299 (1863) plaintiff was walking on the sidewalk next to a bakery and flour warehouse. Without warning, a barrel of flour fell from the second story knocking the plaintiff unconscious. Plaintiff subsequently revived consciousness without any idea of what occurred. Even at the trial, he was unable to produce any evidence except that he was hit by a barrel of flour. He could not explain any other aspects of the accident. Defendant, recognizing the gap in plaintiff's case, did not present any evidence, but legally argued plaintiff should lose because he could not establish causation.

The court rejected defendant's plea, and held for plaintiff. The gist of the judges' opinion was that this type of accident does not normally occur in the absence of negligence, and since it presumably was defendant's flour, Defendant should present any evidence that would refute liability on his part.

As generally applied, the doctrine of *res ipsa loquitur* involves two requirements: First, the accident normally would not have occurred in the absence of negligence; and second, defendant was in exclusive control and dominion of the instrumentality which caused the accident. It is sometimes also said that an additional requirement is that plaintiff be free of fault in the accident. Once plaintiff establishes a prima facie case through *res ipsa loquitur*, the burden of proof shifts to the defendant to rebut the presumption of negligence.

A good example of the application of *res ipsa loquitur* is when a dam gives way without warning on a sunny day. Dams constructed and maintained with the requisite degree of care do not in the ordinary course of events break by the pressure of the water held in the reservoir. See e.g. City Water Power Co. v. City of Fergus Falls, 128 N.W. 817 818 (Minn. 1910); East Liverpool City Ice Co. v. Mattern, 101 Ohio St. 62, 127 N.E. 408 (1920).

Res ipsa loquitur does not apply in every unexplained situation though. Remember that one of the prerequisites is that the accident would normally not have occurred in the absence of negligence. The mere happening of an event does not raise a presumption of negligence. Foy v. Atlantic Gulf & Pac. Co., 4 A.2d 757, 763 (Md. 1939). For example, if a dam fails in an area which historically has a history of periodic floods, the failure may not have been due to negligence. See e.g. New Brantner Extension Ditch Co. v. Ferguson, 307 P.2d 479, 482 (Colo. 1957).

Res ipsa loquitur also does not apply when the precise cause of an accident has been established. Day v. National U.S. Radiator Corp., 241 La. 288, 301-2, 128 So.2d 660, 665 (1961).

IV. DAMAGES

Damages from a dam break may be substantial. While we readily think of the downstream devastation, including loss of life, personal injuries, property damage, and disaster relief, other costs and consequences may also be great. These impacts include repairing or reconstructing the structure, revenue losses to the owner or operator occasioned by the failure of the structure, and losses to a wide ambit of the facility's beneficiaries, such as hydroelectric irrigation and water supply, flood control, and recreational benefits. Farms, homes, and businesses may be inundated. Insurers and real estate lenders, such as banks, may incur substantial losses. Governmental bodies may suffer direct losses, as well as relief and recovery obligations. Environmental damage may be severe. Clean-up and recovery efforts may cover extensive periods of time. Utility services may be interrupted, other businesses adversely affected, and jobs lost. For our purposes though, we are presently concerned with the legal liability costs of the failure.

In most cases the compensable damages recoverable by the victim are relatively clear. The general purpose of damages is to compensate the victim for the loss, that is, to place the victim, as

closely as possible, to the position he was in prior to the injury; in other words, "to make the victim whole". In some situations the assessment can be fairly accurate, as with the diminution in value of real property, the costs of repair, and the value of any chattels, i.e., personal property, lost or destroyed. Restoration costs could involve reconstruction or replacement of damaged structures, such as bridges, even if the cost of restoration might exceed the diminution in value. Moulton v. Groveton Paper Co., 323 A.2d 906 (N.H. 1972). Also relatively easy to compute would be certain forms of personal injuries, such as medical expenses and loss of earnings. Less easy to calculate, and thus much more speculative and subjective, are such intangibles as the pain and suffering incurred by the victims, as well as the value to be placed on any loss of life. Such damages may be large. For example, a 33 year old woman rendered a quadriplegic in the Hyatt Regency skywalk collapse, received a verdict of $15 million. See, Firestone v. Crown Center Redevelopment Corp., 693 S.W.2d 99 (Mo. 1985). Total damages in a dam failure can be high. By way of illustration, Congress appropriated $400 million to compensate the victims of the Teton Dam failure.

In recent years, partially as a result of the Buffalo Creek Dam Disaster on February 26, 1972, a new, much more indefinite element of damages has entered the picture: emotional distress of the survivors. This case involved the collapse of a coal-waste impoundment, which released over 130 million gallons of sludge into a 17-mile hollow, killing 125 persons, injuring over 1,000 others, and leaving 4,000 homeless. Most of the survivors settled with Pittston Company, whose subsidiary owned the dam. However, 643 residents sued Pittston, seeking $64 million in damages. Almost all 643 plaintiffs alleged severe emotional distress. Plaintiffs were sufficiently able to plead emotional distress on the part of survivors, including a class of 33 victims who were absent from the valley at the time of the flood. The court held the "absent"

plaintiffs stated a cause of action for emotional distress damages. Plaintiff's complaint alleged negligence, gross negligence and wanton, willful, reckless and intentional disregard of the lives and property of plaintiffs. Thus, the case went beyond "simple negligence." See Prince v. Pittston Co., 63 F.R.D. 28 (S.D. W. Va. 1974), Note, *Mental Distress-Summary Judgment Improper Where Plaintiffs Allege Severe Mental Distress Despite their Absence From Location of Tortuous Activity*, 63 Geo. L.J. 1179 (1975), and Note, 36 ATLA L.J. 293 (1976).

The case was settled for $13.5 million with roughly $6 million distributed to 625 plaintiffs for the psychic impairment claims. Each survivor received between $7,500 and $10,000 after expenses and legal fees. Stern, "*The Anguish of Buffalo Creek*," TRIAL MAGAZINE 40, 43 (April 1977).

Prince v. Pittston Co. can be distinguished on the basis that it is a federal district court opinion applying what it believes to be West Virginia law. In addition, the case was also at an early, procedural stage of the litigation. However, the West Virginia Supreme Court subsequently cited Prince v. Pittston Co. as standing for the proposition that emotional damages can be recovered for an intentional wrong. Harless v. First National Bank In Fairmont, 246 S.E.2d 270, 276 (W. Va. 1978). As we have seen, there are many situations in which victims can plead an intentional, or grossly reckless act, thereby setting the stage for both punitive and emotional distress damages.

V. CONCLUSION

One added comment should be made here. It should be emphasized that tort law in general, whether the theory is negligence or strict liability, is moving in the direction of victim compensation. Consequently, as in Dawson v. Chrysler Corp., discussed above, most courts strain to invoke liability, particularly when personal injury or death is involved. The odds are

substantial that regardless of the theory cited, the result will be a finding of liability in the case of a dam failure involving loss of life.

The duty of care can arise even though a uniform professional consensus is lacking. By way of illustration, experts often disagree on how to compute the PMP, and thus the PMF. Such differences of professional opinion though are over details, and not the existence of the PMP concept. Most experts will also reach agreement on at least a minimal PMP. Thus, courts consider the PMP in establishing a minimal duty of care.

Participant's Guide

Session 3: Dam Failure Modes and Case Histories

What Will Be Covered in Session 3

- Circumstances that can cause your dam to fail
- How to gain access to the five-day forecast information from the National Weather Service web site
- The many ways a dam can fail
- Case histories of small dam failures
- Recognizing that properly maintained dams are less likely to fail

Session 3 Learning Objectives

- Recognize circumstances and ways a dam can failure
- Gain access to the five-day forecast information from the National Weather Service web site
- Recognize that dams do fail if not properly maintained

Materials

- See Session 3 Powerpoints
- Video: ***Dam Failure Case Histories***

Circumstances that Cause Dams to Fail

Failure often occurs due to a combination of factors, i.e. inadequate design (spillway capacity) combined with an extreme event (rainfall).

1. **Extreme Events**

    a. Rainfall
    b. Wind
    c. Earthquakes

2. **Inadequate Design**

3. **Poor Operation or Maintenance**

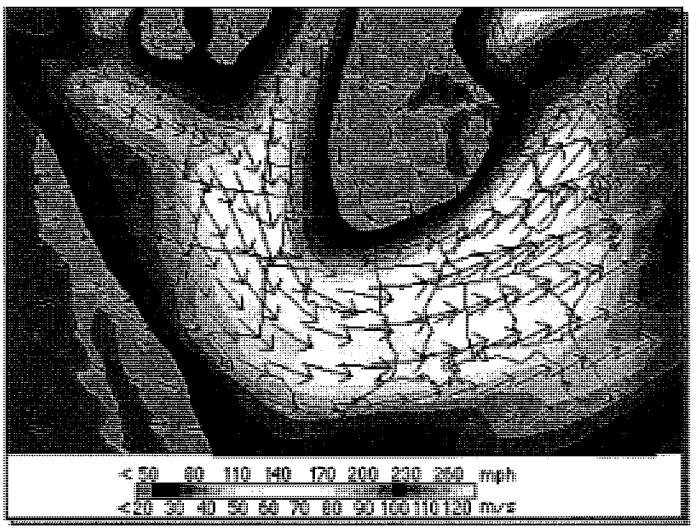
4. **Vandalism**

1. Extreme Events: Rainfall and Wind

Jet Stream Configurations

A. Troughs – or bending – in the *jet stream* originating from low barometric pressure systems extending from the north produce storms.

- The normal or undisturbed jet stream is the high altitude flow of air from west to east near the U.S. - Canadian border.
- Deep troughs in the normal jet stream are caused by low barometric pressure systems extending down from the Arctic or northern Canada.

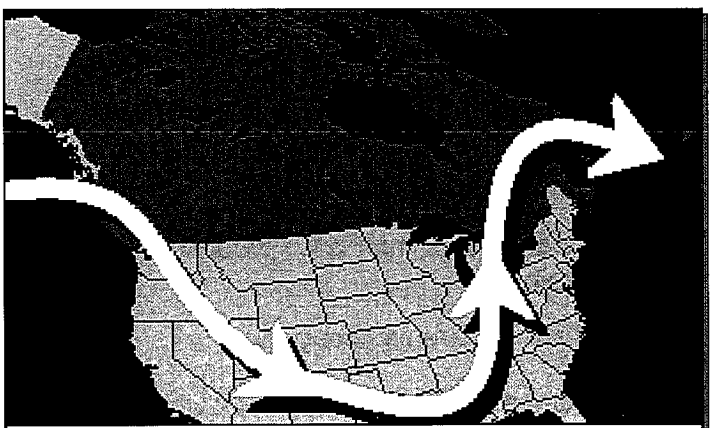


Typical Jet Stream Configuration

- Troughs in the jet stream typically contain eastward-moving low-pressure systems that rotate counterclockwise, creating intense storms.

B. High-intensity storm cells embedded in major low pressure storm systems

- The most problematic condition for extreme storm events is associated with embedded storm cells within otherwise normal widespread storm systems.
- Embedded storm cells are often the cause of catastrophic tornadoes and localized extreme rainfall storm events.



Trough weather pattern

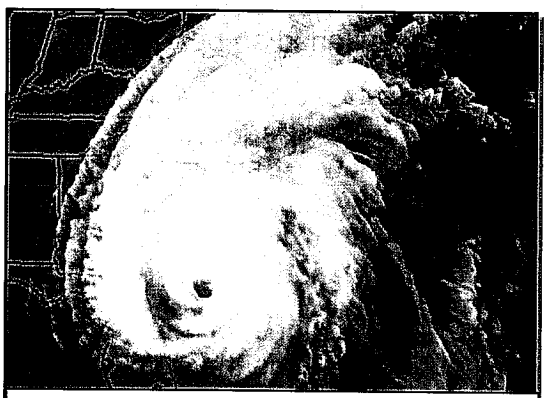
C. Topography can induce local storm events

- Topographic characteristics of the terrain that major storm systems travel across can cause extremely unusual precipitation.
- Wind currents from major storm systems can be disturbed in mountainous areas, producing extreme rainfall amounts.
- There are countless case histories of "Water Spout" in mountainous regions where embedded storm cells cause extraordinary amounts of rainfall in localized areas.

Tropical and Sub-tropical Storm Systems

Tropical depressions can create storm systems.

- Tropical and sub-tropical storm systems originate as low barometric pressure waves that typically travel from east to west across the Caribbean, south Atlantic Oceans and the Gulf of Mexico.
- Low-pressure waves gather strength and moisture in their typically westward movement across the warm waters of the tropical and sub-tropical seas.



Hurricane Floyd off East Coast

Hurricanes are fast moving.

- Hurricanes are relatively short-lived as a result of the typical fast moving center of the storm.
- Hurricanes typically produce more wind damage with extreme short-term rainfalls.

Tropical storms are slow moving.

- Once hurricanes and tropical storms have been downgraded to tropical depressions there is even more danger of extreme storm events because of the slow moving nature of these storm systems.
- These storm systems can produce extreme amounts of rainfall over broad areas in both short and long periods of time.

Embedded storm cells produce extreme localized rainfall.

- Tropical and sub-tropical storm systems typically contain embedded cells of even more severe or extreme storms.
- Embedded cells usually produce extreme rainfall amounts over relatively small or localized areas.
- Embedded cells can affect dams in relatively small watersheds while being totally unnoticed in adjacent watersheds.

Combined Weather Systems

A deep low pressure trough in the jet stream coupled with a tropical storm or a tropical depression equals the "Perfect Storm."

- The possibility of this condition is real as evidenced by recent climatological records.
- A movie made about this very phenomenon that occurred along the northeast coast of the United States.
- An extreme storm system within a deep trough of the jet stream collides head-on with an extreme tropical storm system churning off the northeast coast creating the most extreme storm known in recent climatological history.

This situation could occur almost anywhere within the eastern United States, particularly during the hurricane season (June through October).

Precipitation Data and Flood Forecasting Resources for Dam Owners

Go to the National Oceanic and Atmospheric Agency (NOAA) website for Extreme Storm Event Data and Flood Forecast data via the internet.

National Weather Service and NOAA web sites:

http://hdsc.nws.noaa.gov/hdsc/pfds/

This site:

- Provides precipitation frequency data for selected areas of the United States
- Provides partial duration and annual maximum rainfall data for selected locations
- Provides frequency based data for selected durations

At this site dam owners can:

- View the rainfall data for the location of their dam based on latitude and longitude.
- Look at the five-day outlook, which should be sufficient to allow owners to operate their dams most efficiently to reduce the potential for downstream flooding, overtopping of dams, and possible dam failure.

www.nws.noaa.gov/oh/hdsc/studies/pmp.html

This site:

- Provides Probable Maximum Precipitation (PMP) information for the United States

At this site dam owners can:

- Download PMP Studies for the New Mexico (HMR 49 and HMR 55A)

www.srh.noaa.gov/wgrfc/fop/wgrfcfop.html

This site:

- Provides a five-day forecast
- Asseses risk of significant flooding
- Covers 13 river systems in the United States

At this site dam owners can:

- View the web data to determine if major storm systems are likely to produce a risk of significant river flooding in their area.
- Look at the five-day outlook, which should be sufficient to allow owners to operate their dams most efficiently to reduce the potential for downstream flooding, overtopping of dams, and possible dam failure.

1. Extreme Events: Earthquakes

Earthquakes occur frequently and extreme earthquakes are catastrophic and can result in failure by:

- large slides in earthen or rock fill structures
- liquefaction
- structural failure of appurtenances.

Top Earthquake States

2. Inadequate Design

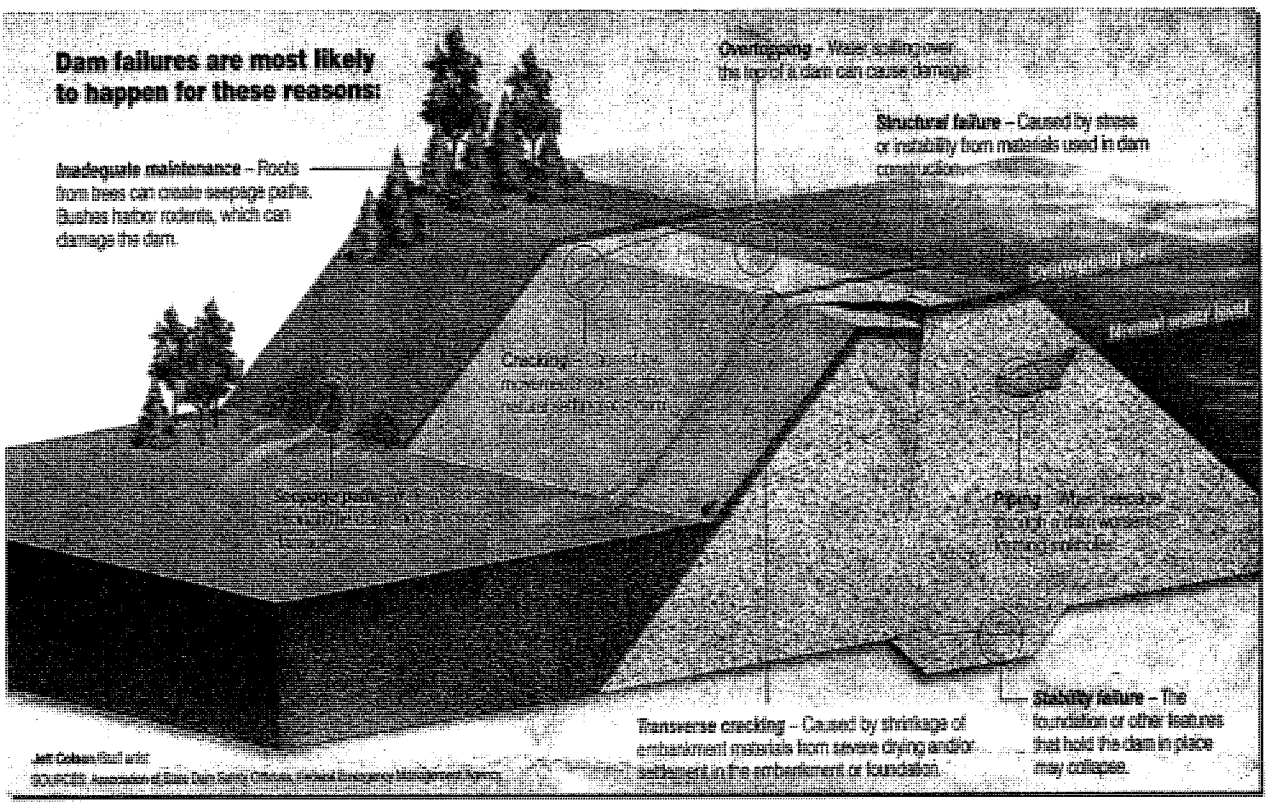
- Sizing of spillways and or appurtenances
- Stability of slopes and appurtenances
- Control of seepage and pore pressures

3. Poor Operation or Maintenance

- . Inoperable gates unusable in emergency
- . Bad maintenance of embankment surfaces cause erosion or uprooting of trees
- Blocked spillways
- . Plugged drains

4. Vandalism

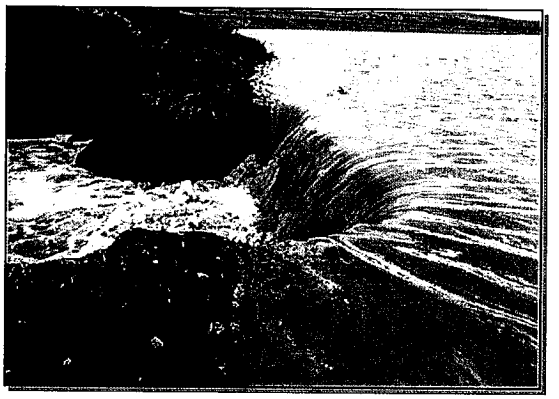
The Many Ways a Dam Can Failure



The Many Ways a Dam Can Fail

1. Inadequate Design: Spillway Capacity that results in Embankment and/or Structural Overtopping

   - Overtopping of earthen dams is likely the greatest cause of earthen dam failure during extreme storm events.
   - Earthen dam embankments typically cannot resist erosion created by high velocity flows during significant overtopping.



Overtopping

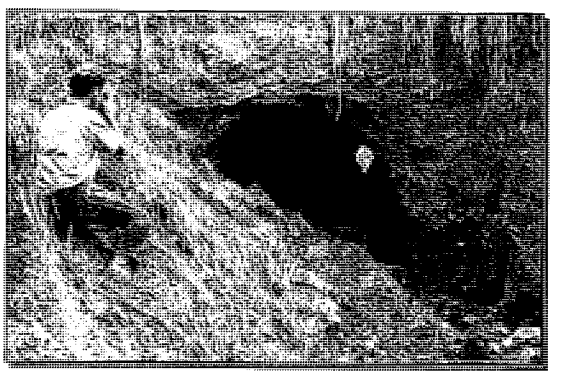
2. Spillway scour

   - Auxiliary and primary spillway systems are always subject to scour during sustained extreme discharge flows.
   - Scour and erosion of these structures can *back cut* upstream through the dam or abutment, resulting in a breach failure.

Spillway Scour

3. Internal erosion along conduits

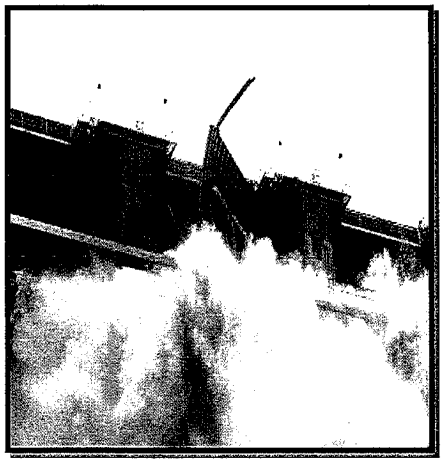
   - Excess hydrostatic head can increase the seepage velocity along conduits through dams thus initiating and/or increasing internal erosion adjacent to dam conduit systems.



Internal erosion along conduit

4. Structural failure of inlet and outlet works

- Increased loading associated with higher water levels during extreme storm events can cause failure of inlet and outlet works that control the rate of floodwater release.
- Failure of appurtenant structures alters the controlled release of floodwater and can result in excessive scour and erosion of other portions of the dam.
- Only a few of the mechanisms of dam failure can occur during extreme storm events.



Structural Failure of Outlet Works

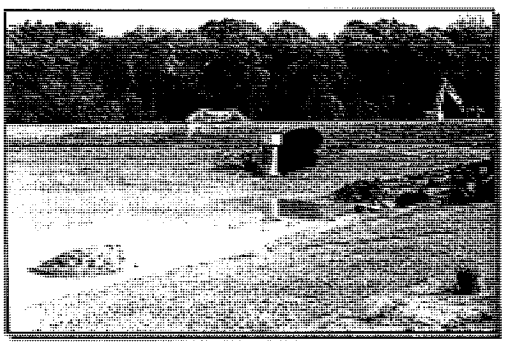
5. Erosion from uprooting of trees and woody vegetation

- Extreme storm events typically have associated high winds that can cause 'blow-down' and uprooting of large trees penetrating earthen dam embankments and abutments.
- Cavities left from *rootball extraction* can expose localized seepage through embankments that can result in internal erosion of the embankment.

Erosion from Uprooting of trees

6. Structural failure of embankment or abutment:

- Higher than normal pool levels and/or plugged embankment drains can increase seepage pressure and rates.
- Wave action from strong winds can cause severe upstream slope erosion.
- Earthquake loading and/or liquefaction caused by earthquake can cause failure of the embankment, appurtenant structures, foundations.



Structural failure of embankment

- Vandalism can cause extensive damage to structures and result in failure of the dam immediately or later during an extreme event

No Dam Owner is Exempt!

- Extreme storm events do occur!
- Dam failures do happen!
- No dam owner is exempt!

Participant Guide

Session 4: Operation, Maintenance, and Safety Inspection of Dams

What Will Be Covered in Session 4

Types of dams and spillways

Functions of dams

Dam operations

Maintenance issues

Maintenance activities

Inspection activities

Session 4 Learning Objectives

Define types of dams and spillways

Define functions of dams

Conduct dam operation procedures

Conduct dam maintenance procedures

Conduct dam inspection procedures

Inspect problems associated with earthen dams

Inspect problems associated with spillway systems

Inspect problems associated with concrete dams and structures

Gain access to and participate in the NPDP program

Materials

See Session 4 Powerpoints
Refer to Appendices B & C and Owners' Manuals on the CD

Types of Dams

Concrete and Rock Masonry Dams

- Gravity dams
- Arch dams
- Arch Gravity dams
- Slab and buttress (Ambursen) dams

Many of the larger well-know dams in the United States are constructed of concrete and typically are arch dams, gravity dams, and arch gravity dams. Some of the older dams in the United States are constructed of rock masonry and typically are gravity, arch, and arch gravity dams. The slab and buttress dam, named after the first designer of such dams, was a common dam design in the late 1940's and 1950's. Many are still in use today.

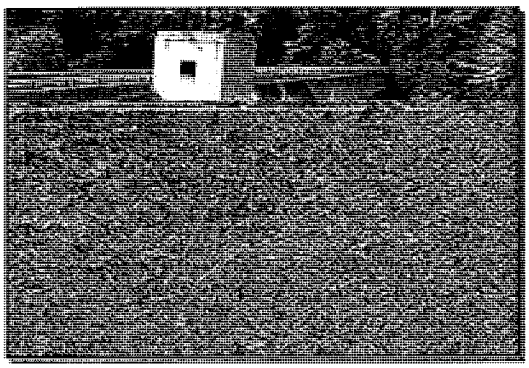
Earth and Rockfill Embankment Dams

Approximately 90 percent of all dams in the United States today are earthen embankment and rockfill embankment dams. Rockfill dams are typically designed as zoned embankments in areas where suitable soil fill materials are scarce. As such, most rockfill dams are located in the western United States.

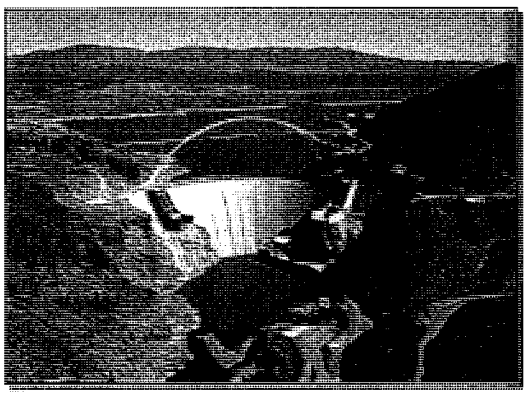
Other Types

- Steel dam
- Inflatable Rubber dam
- Wood

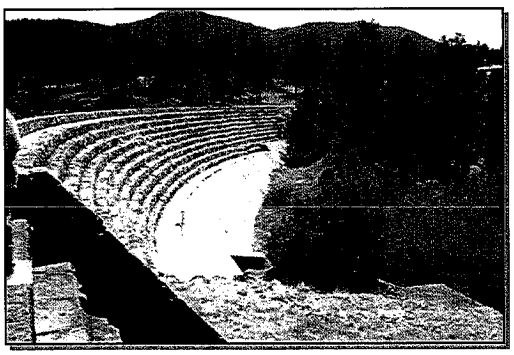
Regardless of the type of dam, all dams must be properly operated, maintained, and inspected by owners, much the same as properly operating, maintaining, and inspecting one's residence or any other property.



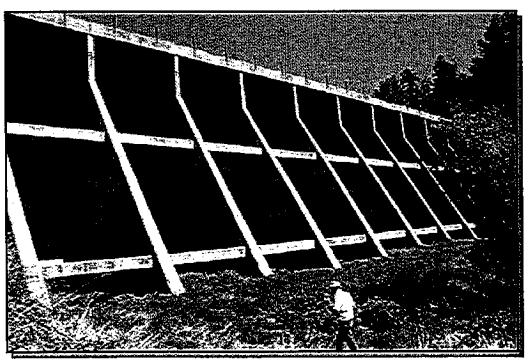
Concrete Gravity Dam



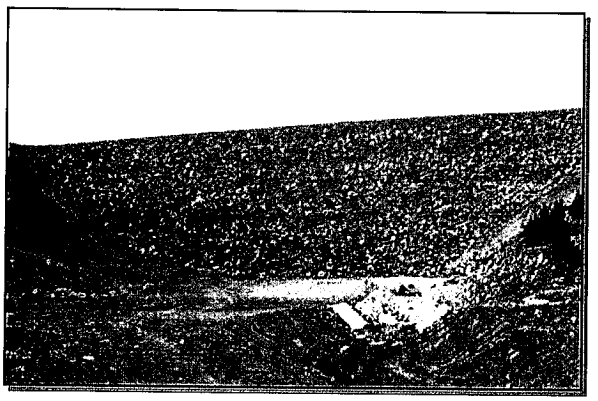
Concrete Arch Dam



Masonry Dam

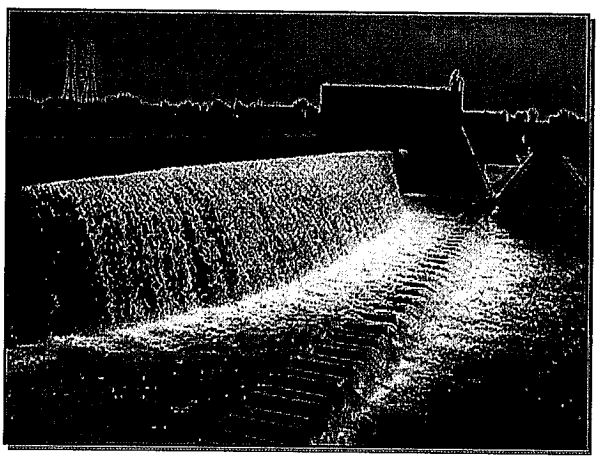


Concrete Buttress Dam



Earth and Rockfill Embankment Dam

Earthen Embankment Dam

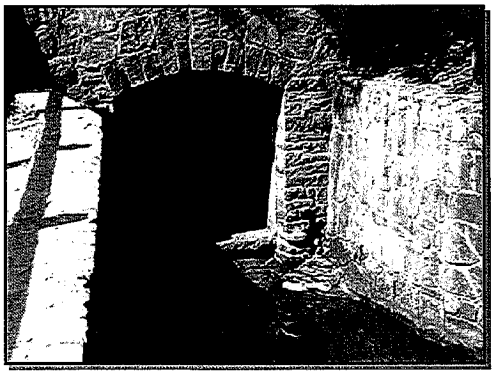


Other Type: Rubber Dam

See Powerpoint Session 4 for additional examples.

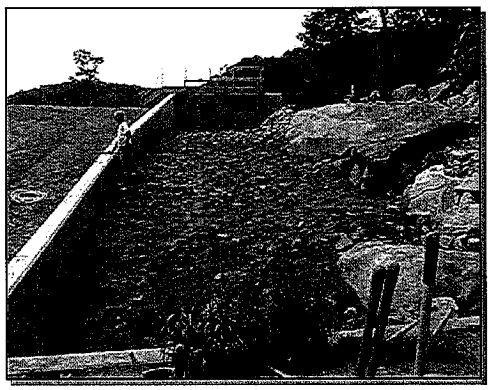
Types of Spillway Systems

Types of spillway systems:



Conduit Spillway Systems

- Slanting Conduit Spillway
- Riser and Conduit Spillway
- Drop Box and Conduit Spillway
- Morning Glory Riser and Conduit Spillway

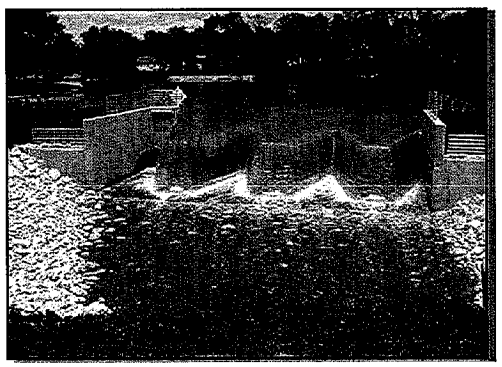


Open Channel Spillway Systems

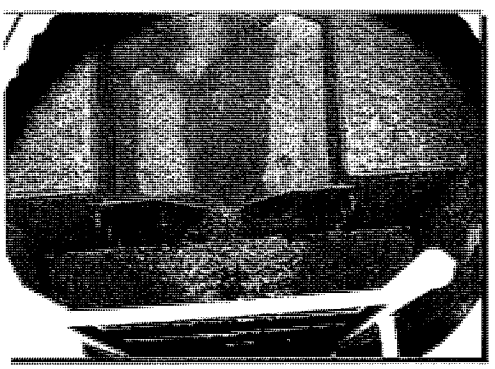
- Unlined earthen channel spillways
- Rock cut unlined channel spillways
- Concrete lined or concrete channel spillways

Concrete Weir/Spillway Systems

All open channel spillways will have some type of weir control at the inlet.



- Ogee section
- Broad-crested weir
- Sharp-crested weir
- Gated weir structures
- Drop Box Inlet
- Labyrinth



See Powerpoint Session 4 for additional examples.

Functions of Dams

Flood control

Power supply

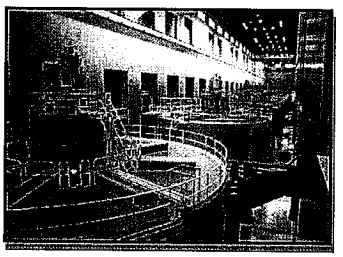
Waste impoundment

Water supply

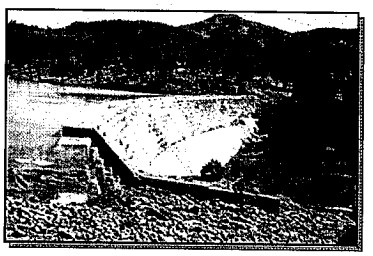
Irrigation

Navigation

Recreation (Approximately 90 percent of all dams in the United States are recreational, or aesthetic attractions within residential developments.)

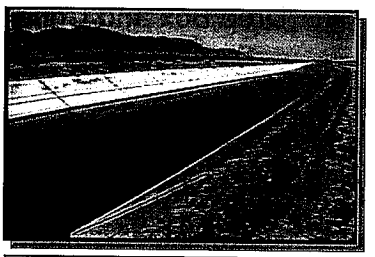


Power Supply



Water Supply

Waste Impoundment



Irrigation

The responsibility for proper operation, maintenance, and inspection of most dams falls upon private dam owner and/or homeowner associations and residential development groups. Proper operation, maintenance, and inspection of a dam is much like that of an older vehicle that is in need of extensive repair to make the vehicle desirably functional: There is usually a significant cost associated with repairing the vehicle. Once it is in good functional order the costs associated with continual proper operation, maintenance, and inspection are minimal. The better these activities are performed, the more economical these activities become, and the more efficient the vehicle becomes.

Dam Operations

An owner must:

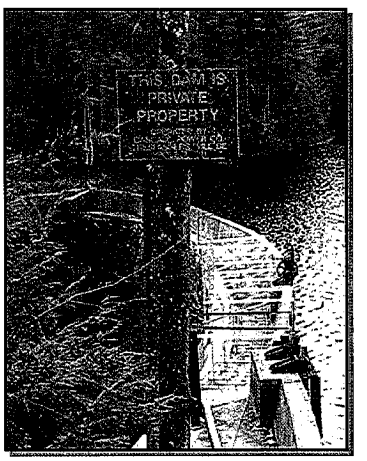
Keep good records

Perform periodic inspections

Maintain an Emergency Action Plan (EAP)

- The EAP must be updated so that all telephone numbers are kept current
- Downstream development is typically a continual activity and this activity can drastically change the contents of an EAP.

Be aware of the need for public safety

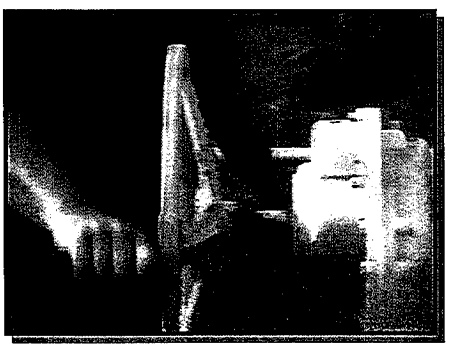


- Because dams are an attractive nuisance and can be dangerous to the public, access must be controlled.
- Proper operation for public safety includes proper warning signs, fencing, etc.

Understand Dam and Lake access control

- Dam and lake access is typically a continual concern.
- Proper operation is required to notify and monitor trespassers.

Test operation of bottom drains, siphon systems and gates/flashboards



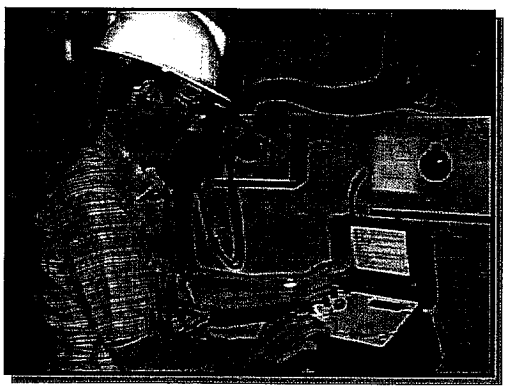
- Bottom drains, siphon systems, normal pool control gates and flashboards and other outlet control works must be operated on at least an annual basis for proper dam operation.
- If a bottom drain system is severely deteriorated, covered with lake sediment, and/or has not been operated in many years the dam owner must have this outlet system thoroughly inspected by a qualified professional engineer prior to operation.

Dam Operations (continued)

A dam owner must:

Fluctuate pool elevation: Fluctuation of normal pool elevations to control aquatic growth can be combined with the debris removal activity.

Remove floating debris: Proper dam operation involves the continual removal of floating debris that might clog outlet works and/or spillway systems.



Maintain and monitor Instrumentation Systems: Instrumentation and monitoring systems must be checked on a routine basis to collect vital data for evaluation of the performance of a dam.

Test Alarm/warning systems: Warning and/or alarm systems must be operated periodically to verify that these systems are operational.

Mitigate wildlife damage control: Undesirable wildlife that might burrow into the dam, undermine inlet and outlet works, and affect spillway systems must be controlled on a continual basis.

Dam Maintenance Factors

Factors that affect proper maintenance of dams:

1. Type of dam
2. Function of dam
3. Size of dam
4. Classification -- the higher the class the higher the standard of duty and standard of care required

And

Watershed characteristics

Characteristics of the contributing watershed, such as acidic drainage, siltation or a heavily developed watershed, can have significant impacts on the quantity of natural and man-made floating debris that can clog and/or block the following types of outlet works:

- Spillways
- Gates
- Flashboards

Spillway system characteristics

Some spillway system and trashrack designs require much greater maintenance activities than other spillway system and trashrack designs. Spillway systems and outlet works must be continually maintained to preclude reduced capacity during significant storm events.

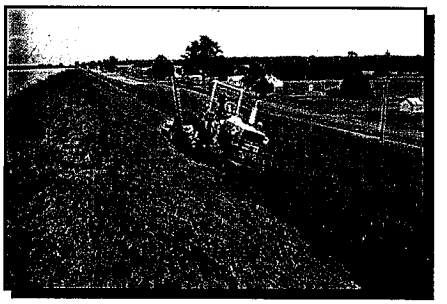
Prevailing climatic conditions

Climactic condictions are often the most important factor affecting the level of maintenance activity. Mowing an earthen dam in the extreme northern U.S. or in the arid southwest once or twice per year may be sufficient to control woody vegetation and undesirable weed growth. Extended growing seasons in the southeastern U.S. may require that the dam owner mow a dam three or four times annually to control undesirable weed and woody vegetation growth.

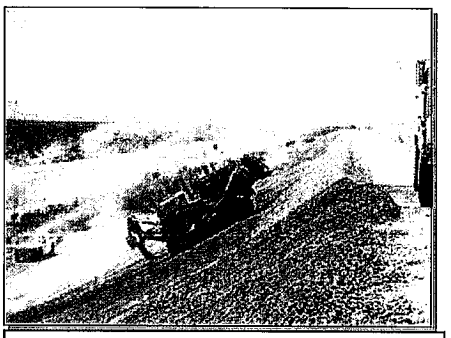
Dam Maintenance Activities

A dam owner must:

- Nurture and mow grassed areas
- Remove woody vegetation
- Remove floating debris from outlet works
- Repair eroded/scoured spillways
- Control and repair wildlife damage
- Opening and closing of outlet gates to ensure operability
- Paint and repair metal components
- Grout and seal concrete joints/cracks
- Remove, repair and protect spalling concrete
- Repair embankment surface erosion
- Maintain and stabilize outlet channels
- Maintain or repair/replace warning signs
- Maintain instrumentation/monitoring systems
- Maintain upstream slope erosion protection
- Remove diseased trees on lake rim
- Remove sediment deposits at inlet
- Control and removal aquatic growth
- Maintain emergency access routes

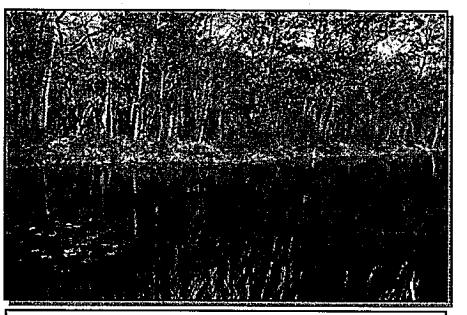


Mowing



Repair Embankment

Remove floating debris



Remove trees & woody vegetation

Dam Inspection Activities: Embankment Sections

What to Look For:

- Stability of Embankment & Structures

- Erosion - Embankment Upstream & Downstream Slopes, Abutment Juncture, Spillways & Outlets

- Seepage - Through Dam, Abutment, Foundation, Around Structures

- Vegetal Cover - Type & Condition

- Deterioration/Cracking of Concrete Surfaces & Structures

Deep Seated Slope Failure

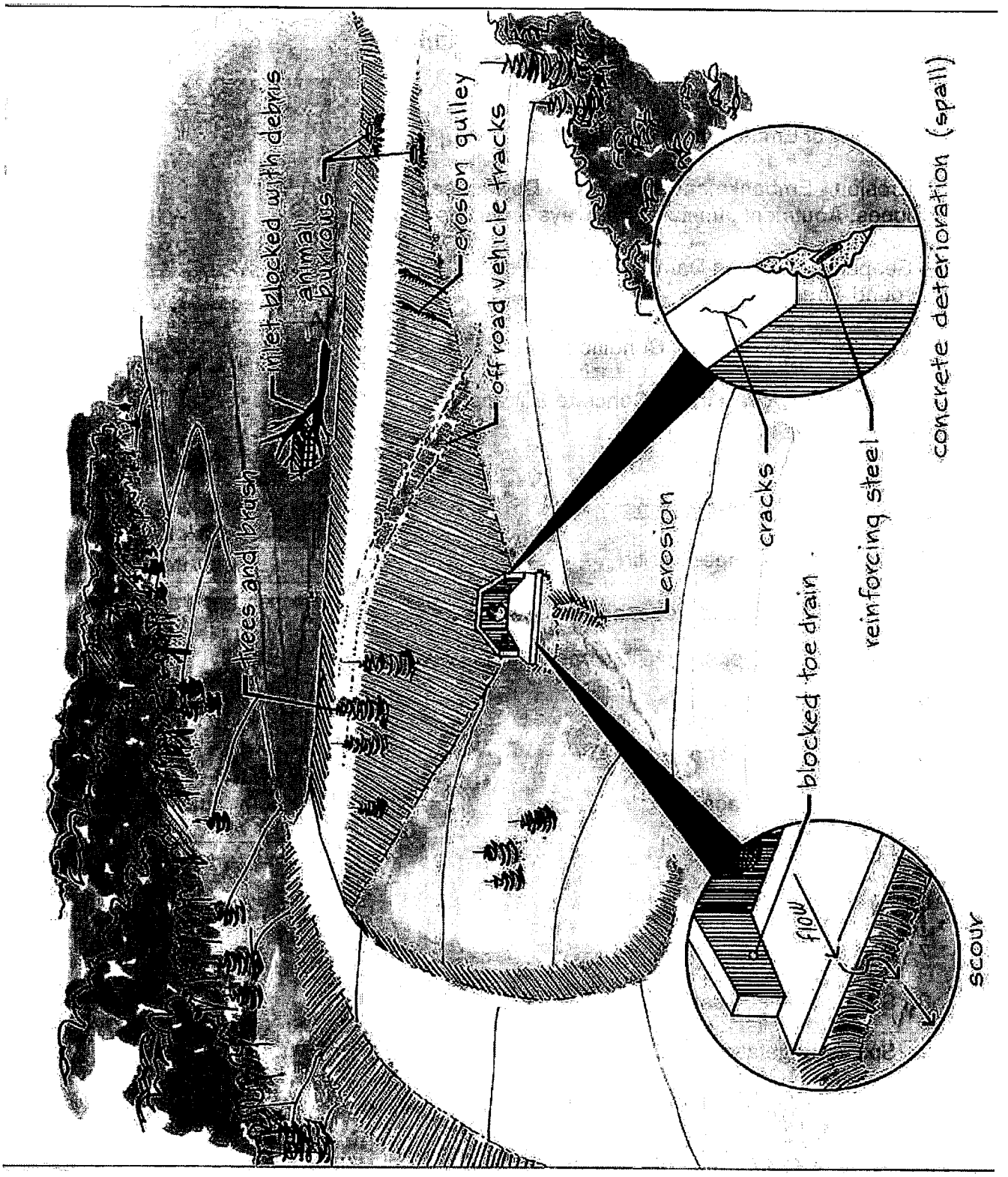
Shallow Slope Failure

Embankment/Earthen Dams

1. Embankment Slope Stability
    - Deep seated slope failures
    - Shallow or sloughing slope failures
2. Wave Erosion
3. Embankment seepage
4. Abutment seepage
5. Foundation Seepage
6. Woody vegetation growth
7. Wildlife damage
8. Sinkholes, depressions and/or dropouts
9. Sparse vegetation areas
10. Surface erosion and/or vehicular ruts

Wave Erosion

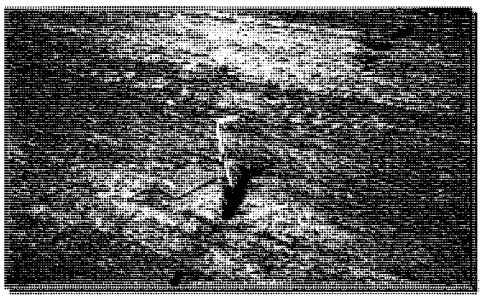
Abutment Seepage


trees and brush
inlet blocked with debris
animal burrows
erosion gully
off road vehicle tracks
erosion
cracks
reinforcing steel
concrete deterioration (spall)
blocked toe drain
flow
scour

Piping or Boil

Wildlife Damage

Sinkhole/Dropout



Embankment Cracking

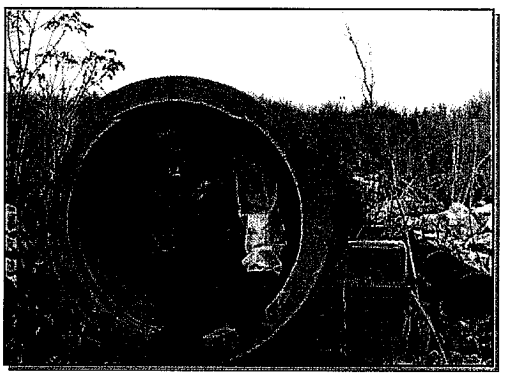
Dam Inspection Activities: Outlet Works

Outlet works materials can be made of:

1. Concrete pipes.

Weaknesses:

- Susceptible to settlement/joint misalignment
- Susceptible to cracking and spalling

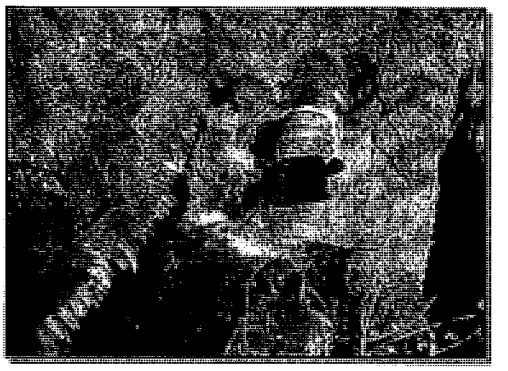


Concrete

2. Metal pipes (CMP, DIP, steel pipe).

Weaknesses:

- Susceptible to corrosion
- Susceptible to deflection
- Susceptible to deflection and brittle rupture

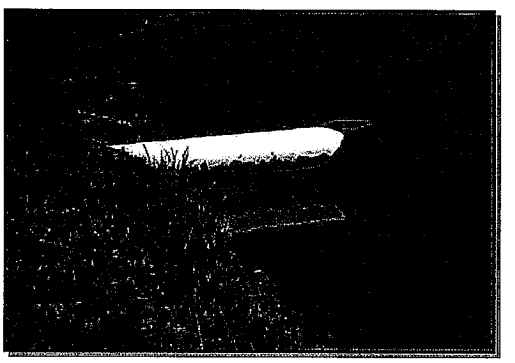


Corrugated Metal Pipe (CMP)

3. High-density polyethylene piles.

Weaknesses:

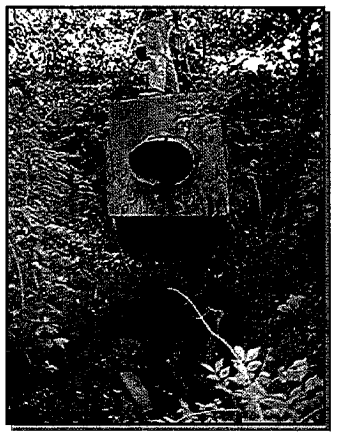
- Susceptible to deflection (Polyvinyl chloride (PVC) pipes)
- Susceptible to weakened joints
- Susceptible to ultraviolet degradation



PVC Spillway Pipe

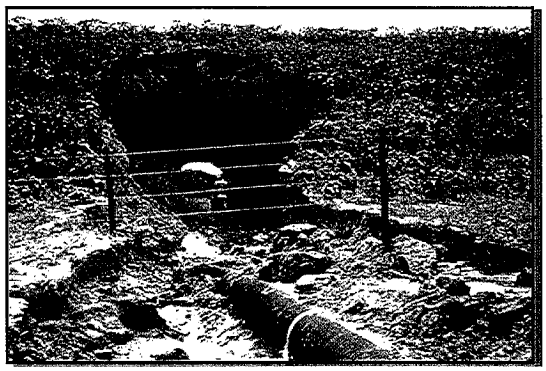
Common Conduit Spillway Problems

- Undermining of conduit outlet
- Seepage along spillway conduit
- Joint deterioration and/or separation
- Differential settlement along conduit
- Misalignment of spillway conduit
- Material deterioration



Undermining of Outlet Conduit

Outlet Conduit Deterioration



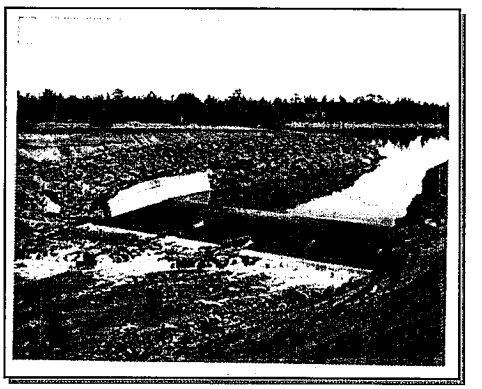
Seepage along Outlet Conduit

Joint Separation of Outlet Pipe

Common Open Channel Spillway Problems

Unlined earthen spillway channels

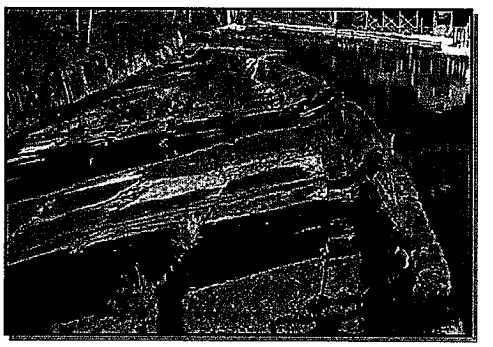
- Woody vegetation growth
- Erosion and scour
- Sparse and/or un-vegetated areas
- Channel slope instability
- Channel obstructions
- Wildlife damage



Unlined Earthen Channel Spillway Erosion

Unlined rock cut spillway channels

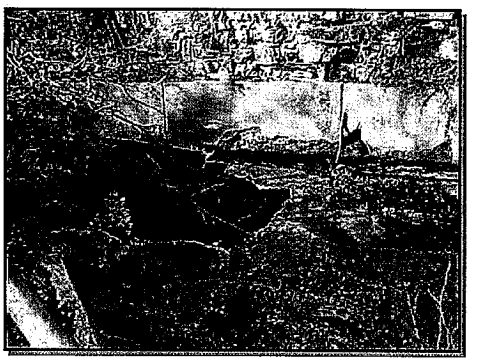
- Erosion and scour
- Misalignment
- Channel slope stability
- Channel obstructions



Deteriation of concrete and joints on concrete lined spillway channel

Concrete lined spillway channels

- Deterioration (spalling) of concrete
- Deterioration of joints and joint seals
- Undermining of concrete slabs
- Settlement and differential movement
- Lateral deflection of channel walls
- Joint separations and lateral movement
- Erosion and scour of outlet channel
- Freeze/thaw changes
- Alkali reactions
- Debris affecting concrete



Undermining of concrete slabs on concrete lined spillway channel

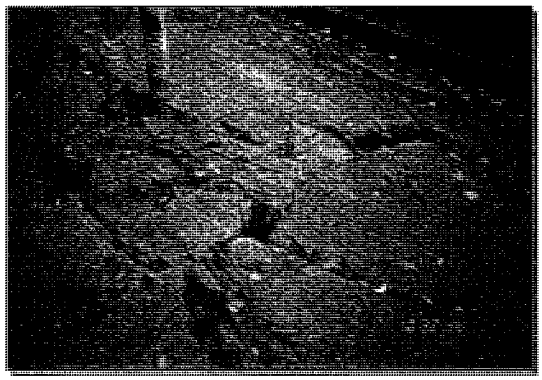
Concrete weir spillway structures – same problems as concrete channels

See Powerpoint Session 4 for additional examples.

Inspection of Concrete Structures

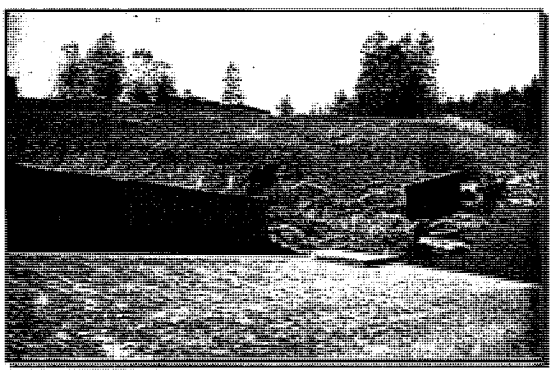
What to Look for:

1. Concrete deterioration
    - Cracking
    - Cavitation
    - Spalling
    - Efflorescence
2. Structural movements
    - Settlement
    - Lateral movements
    - Subsidence
    - Rotation
3. Seepage
    - Abutment seepage
    - Foundation seepage
4. Leakage
    - Vertical construction joints
    - Horizontal construction joints
    - Horizontal/vertical/diagonal cracks
    - Leakage water efflorescence and mineral deposits
5. Proper Operation of Gated Spillway Systems
    - Lifting devices
    - Pin connections and bolts
6. Proper Operation of Drainage Galleries and Drain Systems



Concrete Cracking

Concrete Spalling

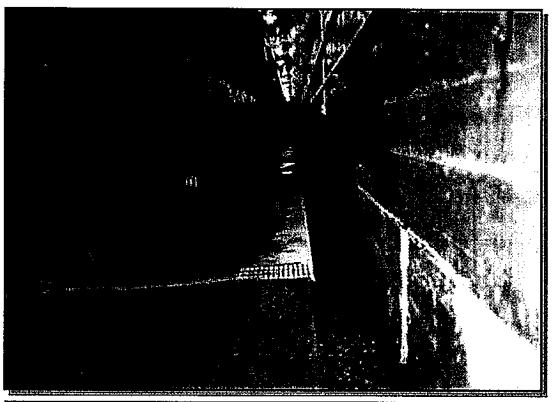


Structural movements - lateral movement

Inspection of Concrete Dams

What to Look For:

1. Cracking - Diagonal, longitudinal, vertical or curved cracking at abutments or buttresses
2. Displacements or Offsets
3. Seepage flows at abutments or foundation
4. Drainage galleries - leakage, displacements & functioning of foundation drains
5. Efflorescence, spalling
6. Monitoring systems present & working



Drainage Galleries/Drain Systems

Participant Guide

Session 6: Public Safety, Security and Dam Owner Liability

What is Covered in Session 6:

- Legal case histories
- Basic legal premises
- Dam owner negligence
- Standard of duty
- Breach of standard of duty
- Causation and damages
- Strict liability
- Dam owner defenses
- Liability related to public safety
- Dam Security

Learning Objectives

- Identify dam owner responsibilities
- Identify dam owners' standard of duty
- Define "strict liability"
- Identify dam owner's responsibility for and understanding of security issues

Materials

See Session 6 Powerpoints

References:

Professor Denis Binder, *Legal Liability for Dam Failures*, 2002
USBR, Training Aids for Dam Safety (TADS), Dam Owner Awareness
FERC, *Safety Signage at Hydropower Projects,* October 2001

LEGAL CASE HISTORIES

Legal Case History 1:

Salt River Valley Water Users Association v. Giglio (1976)

- The court allowed recovery to homeowners who purchased homes in the floodplain. They successfully claimed that the defendant's irrigation canal had inadequate spillways and, thus caused flooding.
- There had been an unusual rainfall that approximated the 100-year flood. Liability was found even though the Association had no legal responsibility to provide flood control and did not operate their canal as a flood control device.
- Once the floodwaters entered the canal system there was a duty to exercise reasonable care in disposing of the water.

In other cases and jurisdictions, courts have also ruled that even though an operator the operator is legally free to pass on the natural flood water flow, he may have a duty to warn the downstream occupants that high volumes of water will be released.

Legal Case History 2:

Kunz v Utah Power and Light (1975)

- In this case the downstream discharge did not exceed the natural flow of the stream. However, the operator had in the past skimmed the peak off of spring floods. This past action induced a reliance expectancy on the part of the downstream farmers, who converted their crops from those that would survive flooding to those that would be damaged by flooding.
- It was held that the operator had a duty to draw down the reservoir when heavy runoff is expected based on a general duty of foreseeability of risk.
- In another case, (People v. City of Los Angeles, 1950) the court stated that completing a new dam did not increase the owner's obligations "unless the owner operated the dam long enough and in such a manner that those downstream could reasonably rely on the continuance of that operation. "

Legal Case History 3:

Downstream property owners v Paloma Ranch (Dam owner), The Flood Control District of Maricopa County, and Owner's engineer.

- Gillespie Dam, constructed in 1928, was a concrete multiple arch dam having a crest length of 5000 feet and a structural height of 35 feet. The purpose of the dam was to divert irrigation water to canals for downstream farms and ranches. The reservoir behind the dam silted up shortly after construction.

- Over the years large flood flows (over 100,000 cfs) passed over the dam with no apparent effect on the dam. Because the reservoir was filled with silt, it had limited storage capacity. During large flood flow periods the reservoir would back up on the farms located upstream of the reservoir.

- In order to relieve upstream flooding, a 1000-foot wide flood channel was cleared through the woody vegetation growth in the reservoir in 1980. The flood control district maintained the cleared strip.

- In 1993, a portion of the dam failed during a period of flooding.

- Following the failure a group of downstream farmers and residents filed suit against three entities for damages they claimed resulted from the failure. They filed against the flood control district, the dam owner, and the dam owner's engineer. Originally the damages were claimed to be in the hundreds of millions and included many miles of lost barbed wire fencing and silt deposited on the farmland and land washed away.

- This suit was dismissed by summary judgment when the judge determed that the plaintiffs had not demonstrated that alledged damages resulted from failure of the dam. However, the judgment was overturned on appeal to a higher court and the case is still active.

- The dam owner filed a second lawsuit against the flood control district claiming that the clearing of the reservoir caused the failure. This suit is also still ongoing.

- Both suits are still active over nine years after the dam failure.

Basic Legal Premises

In today's litigious society it is safe to assume that in the case of a catastrophic dam failure, extensive litigation will ensue. Any competent lawyer, representing the victims, will sue all possible wrongdoers in seeking redress. Lawsuits will therefore most probably be filed against everyone remotely connected to the dam's existence, including the architects, engineers, contractors, sub-contractors and consultants involved in the original construction, as well as those responsible for any subsequent modifications. Potential defendants would clearly include the owners and operators of the facility, quite possibly the state engineer or private dam safety inspectors, and conceivably any insurance company which performed a safety inspection of the facility.

Almost everyone who thinks there is a remote possibility of collecting damages from almost anyone remotely associated with any incident will initiate legal action. Regardless of the outcome, involvement in any type of litigation is time-consuming, costly, and often embarrassing.

Regardless of the jurisdiction, should a dam failure result in loss of life, personal injury or substantial property damage, it is fairly certain today that most jurisdictions will fashion a means to compensate the victims. The basis for these premises is that the overriding purpose of modern tort law is to compensate an innocent victim for any injuries caused by the wrongful acts of another.

Strict Liability

The theory of strict liability essentially imposes liability as a risk of doing business and is derived from the old English case of Rylands v. Fletcher. In this case, a dam and reservoir were constructed by the defendants on a parcel of property with the owner's permission. A shaft gave way and caused the impounded water to destroy the plaintiff's property. The court ruled for the plaintiff, holding that when one brings onto his land, and collects and keeps there anything likely to do mischief, if it escapes, and it is a non-natural use of the land, he must keep it at his peril. The rule is that a defendant is liable when he damages another by a thing or activity unduly dangerous, in light of the place and its surroundings.

The concept of strict liability has been extended widely to activities that are considered abnormally dangerous. The basis for this is the risk of harm and potential magnitude of that harm. Factors to be considered in strict liability include the degree of risk, the potential gravity of harm should the risk materialize, the exercise of reasonable care, whether or not the activity is one of common usage, the appropriateness of the activity to the locality, and its value to the community.

Negligence

The alternative theory of liability is one of negligence, which is the most commonly utilized cause of action in tort litigation. Negligence is generally defined in terms of failure to exercise the standard of care of a reasonable person under similar circumstances. This standard in turn is based on the reasonable foreseeability of the risk. It is important to emphasize that the ultimate question though is, whether in light of that forseeability, how a reasonable person would have acted taking into account the potential magnitude of harm and the alternatives available. Thus, negligence can consist of a failure to act, or the failure to act in a reasonable manner.

It is the owner's responsibility and obligation to act in a reasonable manner to inspect and maintain the dam and its appurtenances.

The key words in any case are:

- *Compensate*
- *Victims*
- *Injuries*
- *Wrongdoers*

The rules of law of each state or jurisdiction must be used to establish the significance and importance of each of these key words in the particular litigation brought forth as a result of an incident.

For purposes of this part of the presentation, we are dealing only with the liability issues that arise out of the sudden failure of a dam. Failure is defined in terms of the uncontrolled release of reservoir water. Such a failure may be of a massive, catastrophic nature, as with the well known Teton Dam Disaster, or of a lesser magnitude. Our purpose is to outline the legal liability issues that arise from these failures. In doing so, we may look to non-dam cases since general legal theories of recovery often transcend specific applications.

Elements of Negligence

Negligence is the most commonly utilized cause of action in both general tort litigation and dam failure cases. Negligence is defined in terms of failure to exercise the standard of care of a reasonable person under similar circumstances. This standard of care is based upon the reasonable foreseeability of the risk. Charvoz v. Bonneville Irr. Dist., 235 P.2d 780, 783 (Utah 1951). The legal duty of reasonable care becomes a calculus of three components: 1) the risk of an accident occurring;
2) the magnitude of harm should the risk materialize; and 3) the availability of alternatives to preclude the accident or failure.

This classic formula of negligence was expressed by the distinguished jurist, Judge Learned Hand, in Conway v. O'Brien, 111 F.2d 611, 612 (2nd Cir. 1940):

> *The degree of care demanded of a person by an occasion is the resultant of three factors: The likelihood that his conduct will injure others, taken with the seriousness of the injury if it happens, and balanced against the interest which he must sacrifice to avoid the risk. All these are practically not susceptible of any quantitative estimate, and the second two are generally not so, even theoretically. For this reason a solution always involves some preference, or choice between incommensurables, and it is consigned to a jury because their decision is thought most likely to accord with commonly accepted standards, real or fancied.*

In terms of dam failure litigation, the findings of Judge Hand can be paraphrased as follows:

a) How likely is a dam to fail?
b) What are the consequences of failure?
c) What safety precautions are available?

It is important to emphasize that the ultimate question though is not foreseeability per se, but whether in light of that foreseeability, how a reasonable person would have acted, taking into account the potential magnitude of harm,and the alternatives available.

For example, if a specified flood were foreseeable, but highly improbable, should a dam engineer design the structure to handle that degree of flooding, or to meet a lesser standard?

In this respect, if litigation ensues after a dam failure, both plaintiffs and defendants would introduce expert testimony on the standard of care to be exercised under the circumstances. The appropriate standard of care would then be determined by the trier of fact, which is usually a jury.

Except when there is no reasonable dispute over issues, the foresee-ability of harm arising from defendant's conduct is a question of fact for the jury. ***Diamond Springs Lime Co. v. American River Constructors, 16 Cal. App. 3d 581, 597, 94 Cal. Rptr. 200, 207 (1971).***

These issues are:

1. *Standard of duty*
2. *Breach of duty*
3. *Causation*
4. *Damages*

1. Standard of Duty

Negligence can exist in any of the following aspects of a dam project:

- Design
- Construction
- Operation
- Maintenance
- Inspection
- Regulation
- Remedial dam repairs and alterations

Negligence can apply to the design, construction, operation, or maintenance of a dam. It may also consist of failing to inspect a dam, or negligence in the actual inspection of the facility. Negligence thus consists either of a failure to act in the first instance, or, if one has in fact acted, the failure to act in a reasonable manner. Since dam failures do not usually occur without warning, there will normally be ample clues, signs, and warnings of impending failure if people are looking for them. Inspections are therefore a critical means of averting dam failures.

Dam owners are considered responsible for carrying out the following duties:

- Regular and complete inspection of the dam
- Monitor conditions regularly
- Maintain the facility
- Prepare and follow the operations manual
- Prepare, test, and update an EAP
- Maintain complete sets of records

It is impossible in an engineering sense to guarantee a structure will never fail. Yet, an owner of even relatively small dams, such as a homeowner association, can take several simple steps to minimize the risk. These measures consist of education, monitoring and review. Education consists of instructing employees and members in danger signs to look out for, and safety measures to be implemented. The purpose is not, of course, to convert lay people into expert

engineers, but rather to utilize simple visual observations for clues of underlying structural problems, as well as to notice anything unusual. Experts can subsequently assess any problems discovered during the routine observations.

Easily observable phenomena include:

- Animal burrows and trails
- Cave-ins
- Concrete disintegration at the top of the dam and elsewhere
- Cracks and cracking
- Damage to instruments
- Dips in the crown of the dam
- Discoloration
- Displacement, such as rip-rap, erosion and bald spots
- Misalignment
- Rodent holes
- Ruts
- Sand boils
- Seepage
- Settlement or displacement
- Sink-holes
- Swirls or funnels around the spillway
- Trees and bushes growing on the dam
- Use of the dam by ATV's and other off-road vehicles
- Whirlpools

These precautions constitute a continuous process as long as the dam stores water. Indeed, anything unusual, or any changes, should be observed and checked.

2. Breach of Standard of Duty

Breach of duty occurs when the dam owner does not maintain the Standard of Duty. It can be established through:

- Expert testimony
- Circumstantial evidence
- Common sense
- Legal theory

3. Causation

The Breach of Duty must be established as the *Causation* of damage/injury to the plaintiff.

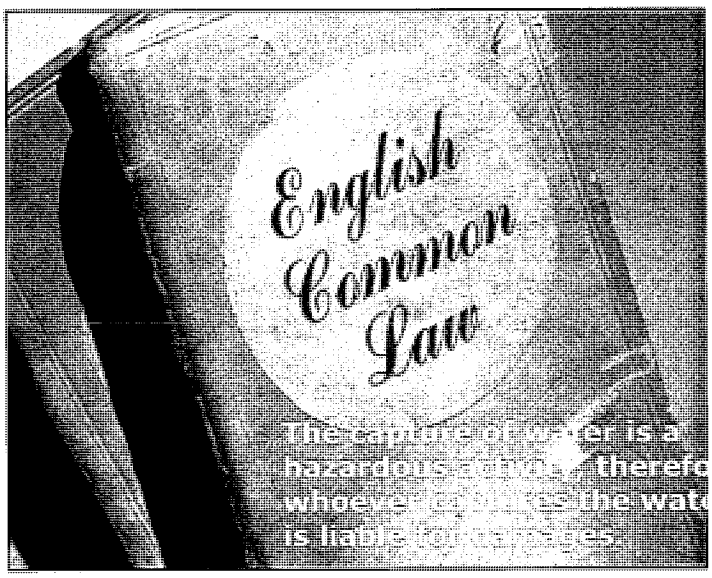
4. Damages

Damages associated with dam failures often include:

- Loss of life
- Personal injury
- Emotional distress
- Property damage:
    - Diminished value
    - Restoration costs and/or replacement

Strict Liability

For our purposes, the major, alternative legal theory of relief to negligence is strict liability. If this approach is used, we realistically do not concern ourselves with the degree of care exercised by defendant, or the reasonableness of his conduct. Strict liability essentially imposes liability as a risk or cost of doing business. This theory primarily concerns itself with the liability of the owner or operator of the facility as compared to the engineer or contractor who is generally held to negligence standard.



Strict liability is derived from the old English case of Rylands v. Fletcher, L.R. 3 Eng. IR. App. Cas 330 (1868), where defendants constructed a reservoir on adjacent land in Lancashire with the owner's permission. Abandoned mine shafts underlaid the area, which is similar to the Scranton, Pennsylvania, region of the United States. Upon partial filling by defendants, the shafts gave way under pressure, causing water to flow through defendants' workings, into plaintiff's, destroying them in the process.

The court ruled for plaintiffs, holding that when one brings onto his land, and collects and keeps there anything likely to do mischief if it escapes, and it is a non-natural use of the land, he must keep it at his peril. If not, he is prima facie answerable for all the damages that are the natural consequences of its escape. As developed by the British courts, the rule is that the defendant is liable when he damages another by a thing or activity unduly dangerous and inappropriate to the place where it is maintained, in the light of the character of the place and its surroundings.

The New Hampshire Supreme Court has stated:

> ***We are of the opinion and hold that RSA 482.42 provides a standard of conduct on the part of dam owners intended to protect against damage from the flooding of the land of others by their dam.***

A similar statute exists in Utah:

> ***The owner of any ditch, canal, flume or other watercourse shall maintain the same in repair so as to prevent waste of water or drainage to the property of others.***

UTAH CODE ANN. ' 73-1-8. However, this statute has been consistently interpreted to impose liability only for negligence, and not strict liability. See e.g. Mackay v. Breeze, 72 Utah 305, 269 P. 1026 (1928); Erickson v. Bennion, 28 Utah 2d 371, 503 P.2d 139 (1972).

The legal theory of *Strict Liability* has ancient origins beginning with the ***Code of Hammurabi*** that states: "In the case of a house being so carelessly built as to cause death to the owner's son", the builder's son was to be put to death. See Witherspoon, Architects and Engineer's Liability, 16 D.L.J. 406 (1967). :

Strict liability is a part of the **Old Testament Law of Moses: Exodus Chapter 21:24** - ***An eye for an eye, a tooth for a tooth, a hand for a hand, a foot for a foot, a life for a life, etc.***

The concept of strict liability has been widely extended to activities considered abnormally dangerous or ultra hazardous. The basis of strict liability for ultra hazardous activities is the risk of harm and the potential magnitude of that harm should the risk materialize. In such a situation, liability does not depend upon such factors as intent, recklessness, knowledge, negligence, moral blameworthiness, or any other degree of culpability. Nor does it depend on the degree of care that the defendant exercised or failed to exercise. Rather, liability is based simply upon the risks involved.

Strict liability is:

- imposed on the owner of a failed dam regardless of the fault or cause of failure.
- generally based on abnormally dangerous and/or ultra-hazardous activities.
- often used in dam failure litigation.
- not applicable in all states.

Dam Owner Defense: Act of God

The Act of God legal defense for claims brought as a result of dam failure is based on the concepts that the failure occurred outside human contemplation and was unaccompanied by human acts of negligence.

The Act of God legal defense fails if failure of a dam was caused by a storm that was similar in magnitude to a previous storm or the "Storm of Record" for the dam or if failure of the dam occurred as a result of a foreseeable storm event.

The Act of God legal defense is typically limited to application in truly unforeseeable natural events (such as earthquakes).

Dam Owner Defense: Standard of Duty

Because of the limitations of the *Act of God* legal defense, the dam owner(s) must often use legal defense based upon the s*tandard of duty*. Standard of duty requires that the dam owner operate, maintain, and repair the dam in such a manner as to maintain the required standard of duty. Therefore, it is imperative that the dam owner be knowledgeable in the areas of dam operation, maintenance, and remediation and/or repair.

Liability Related to Public Safety

A dam owner/operator may be liable if:

- He or she fails to warn or guard against injury from a known dangerous condition or a dangerous condition that he or she should have known about, or

- He or she fails to properly construct or maintain in good repair any structure, recreational equipment, or substantial work of improvement utilized in the hazardous recreational activity or

- An employee's gross negligence is the probable cause of injury

Owners/operators are obligated to inspect all facilities and adjoining areas to identify potential hazards to the public and personnel and to take action to minimize risks. Owners/operators bear an even greater responsibility for the safety of children. Children are generally unable to understand the danger of certain conditions a dam may pose. For example, signs alone may not adequately warn and security fencing may be necessary.

The owner/operator must discover any unreasonably dangerous condition and either correct it or warn potential victims of its existence within a reasonable period of time. The owner/operator does not have to insure against the possibility of injury, but must act reasonably to prevent the possibility of injury.

Courts often recognize that participants are sometimes injured in recreational activities and there is not always a person or agency at fault. For liability to exist, it must be shown that:

- Injury occurred
- Dangerous conditions existed and had potential for harm
- Negligent or wrongful actions created the condition
- Owner/operator had knowledge

The dam owner/operator must:

- Make and keep premises safe
- Avoid conduct or conditions that could injure any person, even trespassers
- Correct existing dangerous conditions and post warnings

Inspections for safety hazards should:

- Be conducted at frequent intervals
- Be conducted at times when conditions are likely to have changed (for example, following heavy public visitation, floods, storms, etc.)
- Be documented and proposed remedial action noted

Remedial actions and completion dates should be documented.

Accidents should be documented.

Accidents should be followed by immediate remedial action upon the conditions that caused accidents.

Common Hazards

Common hazardous areas around dams are:

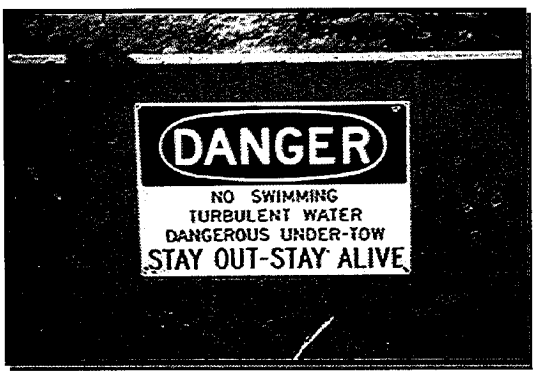
- Spillways
- Stilling basins
- Outlet works intake structures
- Power intake channels and open channel conveyance structures
- Walls, cliffs, and steep slopes
- Power lines
- Swimming beaches

Safety Precautions

Use signs to direct, identify, inform, or warn

Signs should:

- Be located to gain visitors' attention



- Convey the nature of the hazard posed by specific conduct
- Warn of the hazard with intensity commensurate with the potential outcome
- Explain how to act to avoid injury
- Explain consequences of failing to obey

The document "***Safety Signage at Hydropower Projects***" was developed by FERC to provide owners with easy-to-access information and examples of safety signage suitable for use at their facilities. Although general information on safety signs is available, information specific to dam projects can be difficult to locate. Such specific information is often interspersed within larger, more general texts. This document presents the most relevant generally available information, and directs interested individuals to more detailed references and resources. Providing FERC a central location for safety sign information is one step toward helping dam owners to create the safest environment possible at these hydroelectric projects.

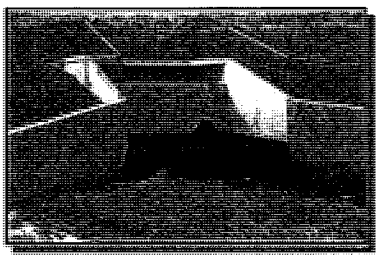
The document contains:

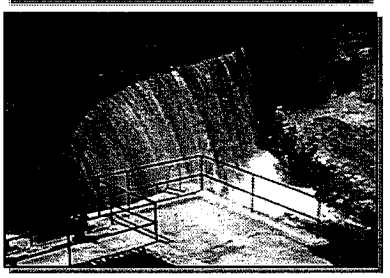
- an overview of safety signage concepts and current standards
- examples of possible dangers associated with hydroelectric projects that require signage
- annotated signage examples;
- a safety bibliography;
- an internet resource list with links to safety web sites, and
- supporting safety documents

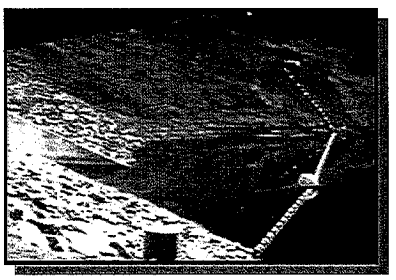
You may access *Safety Signage at Hydropower Projects* on the hydropower page of the FERC's internet site (http://www.ferc.gov)

Additional types of safety precautions:

- Fencing (most common protective device to restrict access to hazardous areas)
- Guard rails (to restrict vehicular access)
- Floating barriers (to restrict or delineate recreational users and provide a means of self-rescue
- Safety ladders (a means of escape from steep slopes/walls/open channels, but also providing access to restricted areas)
- Public awareness programs (brochures, videos, and web sites)







Dam Security

Historically, security concerns within the dam sector were largely focused on minor criminal activities such as trespassing and vandalism incidents, and threats to the sector from environmental activists. Large private sector dam owners and operators tended to be electric generation companies, most of whom had professional corporate security organizations that managed security matters within their overall portfolio of assets that included fossil power plants and large electric transmission and distribution structures. Large dams used for water storage and distribution tend to be owned by municipal or special district agencies. Relatively few small dam owner-operators, whether private or government owned, had organized security programs.

Like all critical infrastructure, the technological and national security environment in which the U.S. dam infrastructure is operated and maintained continues to evolve over time. New threats to the continued reliability and integrity of all infrastructures require vigilance. Areas of possible focus by owners and operators include: surveillance detection, identification of site-related vulnerabilities (e.g., access control, operational security, and cyber security measures), emergency response/prevention issues, and functionality issues governed by interdependencies with other infrastructure assets.

The Dams Sector is comprised of the assets, systems, networks, and functions related to dam projects, navigation locks, levees, hurricane barriers, mine tailings impoundments, or other similar water retention and/or control facilities. Dam projects are complex facilities that typically include water impoundment or control structures, reservoirs, spillways, outlet works, powerhouses, and canals or aqueducts. In some cases, navigation locks are also part of the dam project.

To address security issues related to dams, a partnership approach has been adopted involving Federal, state, regional, territorial, local, or tribal government entities; private-sector owners and operators and representative organizations; academic and professional entities; and certain not-for-profit and private volunteer organizations that share in the responsibility for protecting the nation's critical sector assets

The Homeland Security Act of 2002 provides the basis for the responsibilities of the Department of Homeland Security (DHS) to protect the nation's critical infrastructure/key resources (CI/KR). DHS has been working to establish a partnership and a strategic plan to address dam security issues. As part of the National Infrastructure Protection Plan, a Dams Sector Specific Plan was written and is being used to implement best practices in dam security throughout the dam owning and regulating community. Supervising this plan are two groups called the Dam Sector Coordinating Council (DSCC) and the federal counterpart, the Government Coordinating Council (GCC). These two groups meet quarterly, separately and together to continue the implementation of the plan.

The DSCC was formed in May 2005, and is currently composed of 23 members representing owner-operators from throughout the United States and Canada. It also includes trade associations representing the broad range of owners-operators from across the sector (including ASDSO). The council is currently recruiting additional representation from water sector dam owners. The DSCC has met quarterly since its formation and has been actively involved in the development of the current version of the

Dam Sector Specific Plan (SSP) as well as regularly participating in the Partnership for Critical Infrastructure Security (PCIS) and the National Infrastructure Advisory Group (NIAC) activities. The council also closely coordinates with the Electricity SCC.

The DSCC works closely with the GCC under the auspices of the Critical Infrastructure Partnership Advisory Council (CIPAC). As part of ongoing efforts, the DSCC and the GCC have formed a number of joint work groups to address the following dam security issues:

- Cyber Security
- Information Sharing
- Security Education
- Asset Identification
- R&D
- RAMCAP development

The DSCC has also established ongoing liaison efforts with the Homeland Infrastructure Targeting and Analysis Center (HITRAC) and DHS's National Cyber Security Division (NCSD).

As established in the current version of the Dam SSP, the Councils are committed to expanding outreach throughout the dam sector, particularly to small dam owners-operators who do not have dedicated security staffs.

One initiative is the development of the Dam Sector Homeland Security Information Network (HSIN) portal which provides a web-based vehicle for effective outreach across the sector particularly for alert and event notification as well as educational purposes.

The Councils are compiling security education materials to be used by small dam owners-operators to help in the development and implementation of security programs.

The Awareness Guide for owners is included on the CD. Other guides can be made available to owners through your state dam safety agency.

The DSCC is also supporting R&D efforts over the next several years to better define threats unique to the sector as well as cost effective mitigation measures particularly related to protection of facilities and enhanced recovery methods.

Because dam owners are often involved in other sectors such as energy and water delivery, the Councils are committed to working with DHS and other federal agencies to get a better understanding of, and agreement on, the nature of the threat to the dam sector particularly in the context of threats and risks across all 17 CI/KR sectors. That common understanding will allow the sector to make the appropriate investments in security programs on a rational and strategic basis as well as ensure that their strategy for reducing risk across the sector will be effective.

RESOURCES

Dept. of Homeland Security: www.dhs.gov

The Infrastructure Protection Directorate is developing tools for those managing critical infrastructure and key assets, including dams. Underway are plans to host a national incident management system and online, secure portals where incidents can be reported and threat assessments and alerts will be available.

http://www.dhs.gov/xprevprot/

(They were previously other websites operated by the FBI or other agencies that were dealing with security but are now a part of DHS.

Your State's Department of Homeland Security (accessible from the DHS website above).

DAMSVR software: Contact the Federal Energy Regulatory Commission (FERC): 202-502-6734; www.ferc.gov/industries/hydropower.asp

Sandia Labs: RAM-D (Risk Analysis Methodology For Dams): http://www.sandia.gov/
(Individuals may review and get a license to use RAM-D from Sandia Labs. Some training may also be available. Contact: Jamy Peevy, Org. 5807, MS 0782, Sandia National Laboratories, PO Box 5800, Albuquerque, NM 87175, 505-844-1928. jdpeevy@sanida.gov)

The North American Electric Reliability Council (ESISAC): www.nerc.net

Association of Metropolitan Water Agencies (Water ISAC): www.waterisac.org

Report incidents to:

1. Local Law Enforcement
2. Local FBI: Joint Terrorism Task Force
3. DHS-Information Analysis and Infrastructure Protection Directorate: National Infrastructure Coordinating Center (NICC)

   nicc@dhs.gov
   202-282-9201

4. Electric Sector ISAC (Information Sharing & Analysis Center): esisac@nerc.com; 609-452-1422 (24/7)