

Maryland Dam Safety Update



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Department of
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Dams provide many benefits for Maryland's citizens; however, dams can also be a great threat to the safety and well being of downstream property and people if they are not properly constructed or maintained. Maryland has been assuring the safety of dams since 1934.

Dam Safety Awareness Day 2018: From Johnstown to Oroville to Maryland

National Dam Safety Awareness Day was established to memorialize the devastation that occurred on May 31, 1889, when the South Fork Dam in Johnstown, Pennsylvania failed. This tragic event resulted in the deaths of 2,200 people and left thousands homeless – the worst dam failure in the history of the United States.

In the nearly 130 years since the Johnstown disaster, significant dam failures have occurred that raise the public awareness of the risks that dams pose, that lead to new legislation, and that the engineering community must learn from in an attempt to avoid future failures. Failures such as

St. Francis Dam (1928), Buffalo Creek Dam (1972), Teton Dam (1976), Laurel Run Dam (1977), Kelly Barnes Dam (1977), Ka Loco Dam (2006), and most recently the incident at Oroville Dam in California (2017) come to mind.

The Independent Forensic Team tasked with evaluating the conditions, actions and inactions that caused the damage to the principal and auxiliary spillways at Oroville Dam released their findings in January 2018.

The resultant report provides valuable insight for dam owners, regulators and engineers on the many physical and human factors

that led to the spillway damage and eventually the evacuation of nearly 200,000 persons.

These lessons include the following:

- Periodic inspections and evaluations are not sufficient to identify risks and manage safety;
- Compliance with regulatory requirements is not sufficient to manage risk and meet dam owners' legal and ethical responsibilities;

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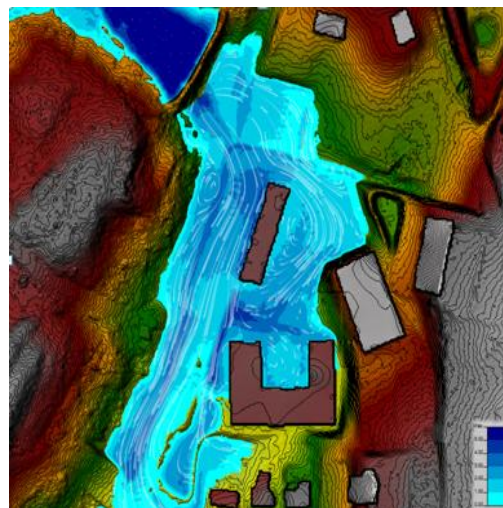
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- Dam owners or their engineers should periodically review the original design assumptions and construction details and determine if repairs or upgrades are recommended to meet current dam industry standards;
- Evaluation of dams require specialized education and qualifications;
- Entities that own dams should ensure that a senior level staff member (one with ability to control policies and funding) serves as the person responsible for implementing safe dam operation and maintenance practices;
- Dam owners should establish rigorous procedures for operation, maintenance, and surveillance of dams as part of a risk management program; and
- Initial observations that are deemed “unusual” can become “normalized” and their significance can be unrecognized and not acted upon.

The size of Oroville Dam and the magnitude of downstream consequences can be hard to compare to the average earthen dam in Maryland (typically 26 to 27 feet tall). However, the lessons learned from the Oroville incident can be applied.

Only one month ago a high hazard dam in Washington County experienced a seepage (internal erosion) event due to elevated lake levels. The dam owner took immediate action, including notification of Dam Safety and activating their Emergency Action Plan to Level 2. Corrective actions were implemented, including drawing down the reservoir level and installing temporary sand bag and gravel filter berms at the multiple seepage exit points. Once the situation was stabilized, a review of the project’s records indicated that seepage incidents were evident throughout the 50 year life of the dam. After a number of the incidents, efforts were made to install additional drains and filters. While not exactly analogous to the “normalization of unusual incidents”, the seepage problems persisted and the symptom was treated, but not the cause. The owner is now taking steps to perform a comprehensive evaluation of the dam design and performance to inform necessary repairs and upgrades.



HEC-RAS Developments

Exciting advances in technology for conducting dam breach analyses have arrived in the public domain. In the last month, the Hydrologic Engineering Center of the US Army Corps of Engineers released version 5.0.4 of its HEC-RAS program. As it relates to Dam Safety, the program allows users to rapidly set up and run 2D dam breach analyses, which can more accurately account for flow attenuation as the floodwave travels downstream, and can provide powerful graphics that are helpful for understanding the danger reach. Version 5.0.4 is an improvement over version 5.0.3 in that it allows users to model flows through the dam using rating curves, and allows for better modeling of culverts, among other things.

If sufficient interest is expressed, the Department would like to provide training in the use of this software for conducting dam breach analyses. Please send requests for updates on the guidance document and training to Scott Bass at Scott.Bass@maryland.gov.



Dam Safety Training Opportunities

ASCE EWRI Congress
June 3-7 Minneapolis, MN

ASDSO Northeast Regional Conference
June 4-6 Lancaster, PA

ASDSO Webinar: Designing Spillways to Mitigate Failure Modes
June 12 damsafety.org

ASDSO Seminar: Seepage Through Earthen Dams
June 12-14 Chicago, IL

ASCE Seminar: Dam Breach Analysis Using HEC-RAS
June 13-15 Denver, CO

ASDSO Webinar: Evaluation and Maintenance of Piezometers, Relief Wells, and Drains
July 10 damsafety.org

ASCE Seminar: HEC-RAS Computer Workshop
July 18-20 Manchester, NH

ASCE Seminar: Two-Dimensional Modeling Using HEC-RAS
July 25-27 Minneapolis, MN

ASDSO Seminar: Inspection and Assessment of Dams
July 31-August 2 Madison, WI

ASDSO Webinar: Human Factors in the Oroville Dam Spillway Incident
August 14 damsafety.org

ASDSO Dam Safety 2018
Sept. 9-13 Seattle, WA

AEG Annual Conference
Sept. 15-23 San Francisco, CA



Emergency Action Plan Tabletop Exercises

Since 2008, the Dam Safety Division has worked with dam owners, operators and county Emergency Management professionals to hold county-wide Emergency Action Plan (EAP) Tabletop Exercises (TTX) for the benefit of all the stakeholders. A TTX is a discussion-based session where stakeholders meet in an informal, classroom setting to discuss their roles during an emergency and their responses to a particular emergency situation. A facilitator guides participants through a discussion of one or more scenarios. The duration of a tabletop exercise depends on the audience, the topic being exercised and the exercise objectives, but typically lasts no more than a few hours.

Recent participation by a number of counties to coordinate dam-specific EAP TTX events has proven valuable to all those involved, and has helped ensure that plans are actionable in the event of an incident at a dam. In some counties, EAP TTX events are now an annual event.

Given staff turnover, retirements or reassignments within organizations that own or operate dams, as well as with first responders and the Dam Safety Division, it is imperative to conduct dam EAP TTX seminars/workshops frequently in order to update everyone with the intricacies of the dam and the evacuation process to be prepared in an emergency.

The Dam Safety Division reminds all dam owners that attendance at an EAP TTX is now required by law at least once every five years, but more frequent attendance is suggested if staffing conditions change frequently. Owners must also be aware that while the Dam Safety Division coordinates with many, but not all counties to hold EAP workshops, it is the owner's responsibility to ensure that they meet the minimum frequency as required by law.

Legislative Update: SB100 Small Pond Delegation

The General Assembly passed legislation this spring that provides flexibility to establish regulatory partnerships for safety at small low hazard dams. Senate Bill 100 (SB100) allows the Department to designate for small pond review and approval authority to other entities.

Any designation will require approval of a Memorandum of Understanding between the Department and the designee that formalizes the requirements associated with the authority.

The ability to designate other agencies for small pond review and approval authority will increase the efficiency of the permitting process and will allow the Dam Safety Division to redirect resources toward critical public safety responsibilities such as ensuring the integrity of high- and significant-hazard dams.

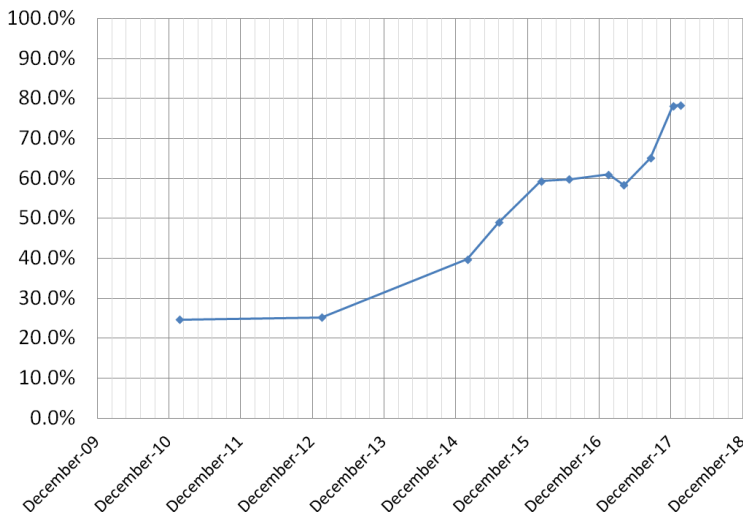


Emergency Action Plan Legislation, One Year Later

With the passage of the HB125 in the 2017 General Assembly Session, Maryland law now requires all owners of High and Significant Hazard Dams to update their Emergency Action Plan (EAP) each year by May 1st.

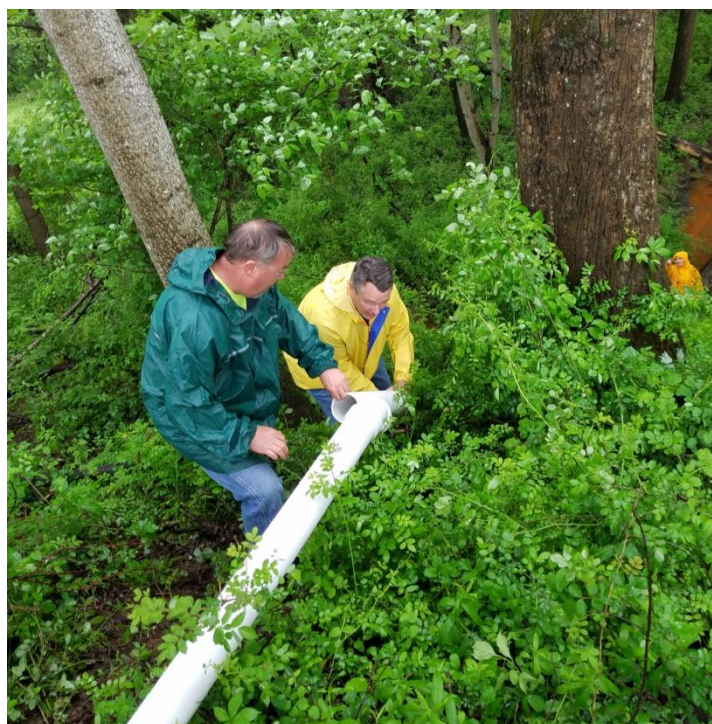
The Dam Safety Division staff has performed outreach over the past year in person, by email, through this newsletter, and through our workshops to remind dam owners about the need to contact the signatories on their EAPs and update their information if any changes are necessary.

Dams With EAP in Compliance



The Dam Safety Division is happy to report that the response from the dam owners has been outstanding. In fact, in some areas of the State there has been a 95 percent compliance rate.

Since the passing of the law, there has been a sharp increase in the percentage of High and Significant Hazard dams with up-to-date EAPs. However, 20 percent of owners remain out of compliance. If you have not submitted your EAP, it is very important that you do so immediately. Compliance with the EAP law helps avoid the unfortunate realization that names and phone numbers are out of date when needed the most, in an actual emergency.



Updated Guidance for Breach Analysis and Hazard Classification now available!

The Dam Safety Division receives many requests for detailed information and technical assistance on how to design dams and perform breach analyses. While the ultimate responsibility for proper dam design lies with the design engineer, it is hoped that the development of this guidance document will be a valuable resource to the Dam Safety Division and the regulated community.

The document presents a simple, clear, concise and adaptable guidance to help guide the design engineer through completing a breach analysis and determining the hazard classification of a dam. A method to determine the appropriate hazard classification is presented and applies to both large dams and smaller pond embankments or waterway impoundments. The document presents a stepped analysis with increasing technical levels as the downstream areas become more complex and/or a higher classification becomes appropriate.

This document replaces previous guidance provided by the Dam Safety Division on hazard classification for dams and small ponds, but many of the concepts and requirements remain with only minor changes. The guidance provided in this document represents sound engineering practice for average situations.

The currently available version of the guidance document is considered to be a working draft and can be used immediately, though the guidance is intended to be a living document and will be updated from time to time with new information as it becomes available. For more information on the guidance document, if clarification is required, or to submit comments or questions, contact Scott Bass at scott.bass@maryland.gov



Spring/Summer Maintenance

Now is a good time to perform regular maintenance and repairs at your dam. In particular, the Department recommends that:

- Grass is mowed and woody vegetation is removed before significant new growth appears
- Embankments are checked for unusual conditions such as seepage, slumps, unusually lush vegetation, erosion or animal burrows
- Concrete structures are checked for cracks, leaks or movement
- Trash racks are kept clear of debris that may have accumulated during high spring flows
- Valves are exercised and lubricated as needed to ensure proper working order
- Emergency Action Plans are updated

Rigorous maintenance programs are often necessary to ensure that conditions at a dam do not deteriorate over time. If you find a condition that needs attention, the Dam Safety Division is available to provide advice on next-steps.



See you in Lancaster:

Dam Safety to present at ASDSO Regional Conference

The Dam Safety Division will be well represented at the Association of State Dam Safety Officials Northeast Regional Conference in Lancaster, PA. The conference, which runs between June 4th and June 6th will focus on issues of importance to dam owners, government officials and engineers in the northeast region with applicability to the greater dam and levee safety community as well. The conference offers general and concurrent technical sessions, timely panel discussions, an informative exhibit show, and networking opportunities with colleagues from across the region.

Dam Safety staff will be presenting at the following sessions:



Tuesday June 5. 3:30pm **Hal Van Aller, P.E.** “Lessons Learned from 20 Years of Spillway Pipe Rehabilitation in Maryland”



Wednesday June 6. 10:30am **Visty Dalal** “Rehabilitation of the Historic Devils Backbone Dam, Washington County, Maryland”



Wednesday June 6. 10:30am **John Roche, P.E.** “Leveraging Stormwater Retrofits for Dam Safety Improvements: A Summary of Maryland’s Experience”

