

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 determined that the plaintiffs had not demonstrated that alleged 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 foreseeability, 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 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).**

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

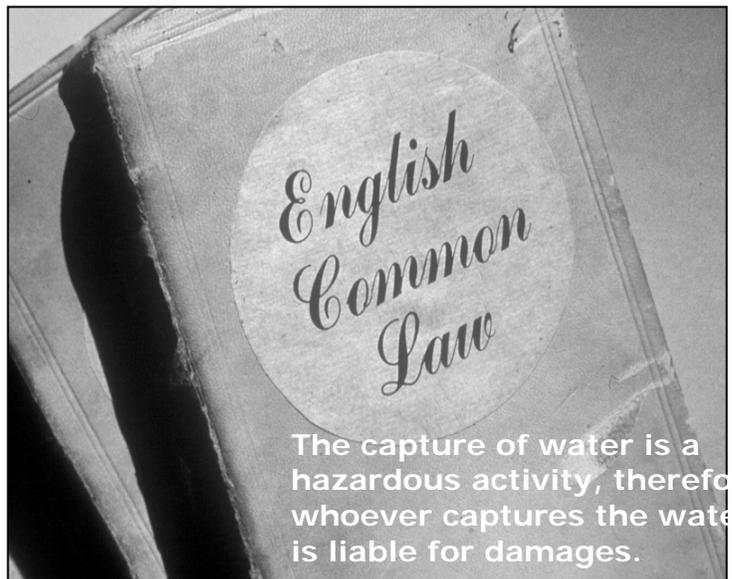
Damages associated with dam failures often include:

- 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 *standard 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.

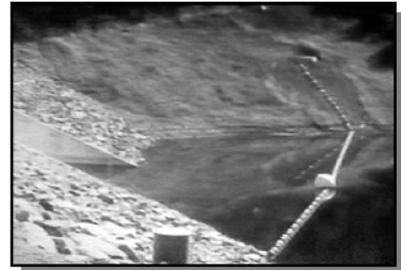
The document contains:

- 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 (<https://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: <https://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.

(The link provided was broken and has been removed.)

(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; <https://www.ferc.gov/hydropower>

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)

North American Electric Reliability Council: <https://www.nerc.com/>

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)