Association of State Dam Safety Officials

Written Responses for the Record
to the Hearing Conducted
July 26, 2006
By the
Subcommittee on Economic Development, Public Buildings and Emergency Management

1. Do you support H.R. 4981, which reauthorizes and improves the National Dam Safety Act?

Yes, without question. H.R. 4981 authorizes an essential program necessary to improve the safety of our nation's dams. This Act and the National Dam Safety Program provide key elements supporting all state dam safety regulatory programs.

a. Do you have specific changes that would allow you to support it?

ASDSO supports H.R. 4981 as written. As with any proposal, however, refinements could improve the Act or the implementation and effectiveness of the national and state programs.

As an example, the Association believes that significant advances in the safety of the nation's dams are more likely to be achieved through the technical experience and leadership of a federal agency that is focused on engineering, structures, protection and problem-solving rather than on response and recovery. In light of proposed levee safety legislation, serious consideration should be given to the technical administration of both the dam safety and levee safety programs by the same federal agency—that is, the U.S. Army Corps of Engineers.

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Other suggested changes include:

- Incentives to increase the number of Emergency Action Plans (EAPs) on dams
- Disclosure of dam-related issues to potential owners of dams, property bordering impoundments, and property within dam break inundation zones.

2. Do you support H.R. 1105, the Dam Rehabilitation and Repair Act of 2005?

Yes, without question. Inspections, education, and research alone will not improve the safety of dams. The proposed H.R. 1105 is a great step toward solving a long-standing dam safety problem.

There is an enormous demand for funding to repair unsafe dams, both publicly and privately owned. Most dam owners are not willfully negligent; however, many owners—both public and private—cannot afford expensive repairs. As thousands of dams constitute potentially serious hazards to downstream lives and property throughout our nation, the need for a rehabilitation funding program is clear.

a. Do you have specific changes that would allow you to support it?

ASDSO supports H.R. 1105 as written. We respectfully suggest consideration of expanding the Act to include privately owned dams. We suggest several approaches, all in cooperation with state dam safety agencies:

- Expansion of the proposed grant program to include privately owned dams
- Establishment of a low-interest loan program for dam repairs and upgrades
- Allowance of income tax credits or deductions for dam repairs and upgrades

3. H.R. 1105 does not fund private dams. What are the needs associated with privately owned dams?

Dam owners need a reliable source of funding for dam repairs and upgrades that will resolve safety and security issues. Of the approximately 79,000 dams in the National Inventory of Dams, most (64%) are owned by private businesses or citizens.

It is difficult for many private dam owners to find the funding to undertake rehabilitation work when necessary. Because of this difficulty, repairs are often postponed; dams deteriorate further; minor problems become major problems; remedies become more expensive.

To be safe, dams require maintenance. Occasionally, dams must undergo major repair, upgrades, or rehabilitation due to structure and component age, deterioration, outdated designs, improved techniques, and better understanding of events that can threaten dams, such as earthquakes and potential flooding conditions.

Likewise, a well-maintained dam may require an upgrade as a result of downstream development. (As potential risks posed by a dam increase, so do state-mandated technical standards.) Most dam owners have no power to control downstream land use; thus, a low-hazard-potential dam can become a high-hazard-potential dam within a single day. Suddenly, because of actions over which the dam owner has no control, the owner is in the difficult position of having to spend tens of thousands (and sometimes millions) of dollars for expensive upgrades, such as increasing a dam's spillway capacity or constructing an emergency spillway.

Funding assistance, through government or private sources, is inadequate at best. Only 15 states offer loan programs, and funding for at least two of these programs is in jeopardy. As a result, there are scores of U.S. dams long overdue for repairs, and many more scores of people whose lives and property are, accordingly, at risk

In some situations the needs associated with privately owned dams are more basic. Some owners do not realize their responsibility and liability in regard to the downstream public, property and environment. Adequate understanding of proper dam maintenance and upgrade techniques—as well as the need for a sound emergency action plan—are typical problems among many owners across the United States.

4. What, beyond those proposed by Mr. Kuhl and Ms. Kelly, are necessary to improve the program?

- A continued increase in authorized funding levels for HR 1105 with annual full appropriation to address our nation's $10 billion dam rehabilitation need
- An amendment to Ms Kelly's bill to include funding for privately owned dams, as their failure can have the same horrific consequences as failure of publicly owned dams
- A low-interest, revolving loan program to provide assistance to private dam owners.
- A requirement that dams rehabilitated under this program have an up-to-date and exercised emergency action plan
- Incorporation of a dam-break inundation clause on the state's uniform Sellers Disclosure of Property Condition statement. (California is the only state that currently requires sellers to disclose whether any portion of their property is located in a dam-break inundation zone [Cal. Gov't § 8589.4]).

- Encourage owners of high hazard dams to maintain minimal liability insurance.

5. Why should the federal government assist in funding state and local dams?

Dams provide a life-sustaining resource to people in all regions of the United States. They are an extremely important part of this nation's infrastructure—equal in importance to bridges, railroads, highways, and airports. They can serve several functions at once, including water supply, navigation, recreation, flood control, energy, irrigation, and waste impoundment.

A dam failure can have many effects aside from economic loss to the dam owner. Failures can have devastating long-range economic impacts on a region, cause loss of life and tremendous property damage, and increase federal expenditures for disaster relief. Numerous examples illustrate these points. (See *Dam Failures and Incidents* attachment.)

The National Flood Insurance Program and the President's Disaster Relief Fund are typically the sources for repair and recovery costs for flood-damaged areas. These repair and recovery costs—even for a single dam failure—often far exceed the cost of preventive rehabilitation and dam safety program costs.

Dam failures and their potential flood inundation areas do not respect state or national boundaries. This a significant concern as failures of several U.S. dams could cause loss of life and significant property damage in Canada, Mexico, or adjacent states. The recent near-failure of a dam in Juarez, Mexico and the subsequent evacuation of parts of El Paso presented a clear and timely demonstration of potential international implications of dam failures. The accompanying table shows a state-by-state look at dam inundation areas that cross state and international borders.

The Federal Government owns and regulates many dams, and, by example, clearly sets the course of what it means to be a responsible owner. If the Federal Government does not provide direction on this topic, no one will.

6. H.R. 4981 defines "state regulated dams." Could you please discuss the need for this statutory definition and the effect it will have on the existing program.

The National Dam Safety Board of Review has long recognized the need to have a more consistent definition of "state regulated dams" so all states can use a similar definition when reporting program numbers to FEMA. These numbers are ultimately used in federal state assistance funding level determination equations. A definition will assist in providing a fair distribution of limited financial resources.

The National Dam Safety Program (NDSP) is intended to assist and support state dam safety programs through many initiatives, including financial assistance awards. This financial assistance program was created to have states continue making programmatic improvements, working toward fulfilling all of the criteria in Section 8 e(2)(A).

Three criteria are judged by the dam safety community and the National Dam Safety Board of Review (NBR) to be the essential functions required to truly "regulate" dams:

a) the authority to inspect dams,

b) the authority to review design plans and

c) the authority to take enforcement actions.

Several states do not have these three critical statutory authorities, but, in accordance with the NDSP, should work toward acquiring them.

The funding levels for the financial assistance granted to each participating state are derived from a formula based on the number of dams listed as “state-regulated” in the National Inventory of Dams (NID). The greater this number, the greater financial assistance a state receives. State dam safety programs self-certify, to the NID, the number of “state-regulated” dams in their state. However, several states argue that having only one of the three essential functions constitutes “regulation” and are submitting inflated data to the NID according to their definition, despite the unmistakable determination of the NBR that all three are required.

The amendments in HR 4981 that address the definition of “state-regulated” are necessary in order to provide uniform rules for all states to determine what qualifies as “state-regulated” and to ensure uniform computation of the financial assistance awards. It is counter-productive to the philosophy of the NDSP and a disincentive to continue to reward inflated grants to states that lack the three requisite statutory authorities to truly regulate dams.

7. In your testimony you mention that H.R. 4981, the Dam Safety Act of 2006, defines "state regulated dam” which is critical to establishing funding levels and incentives to states. Please tell us more about why this is important.

The State Assistance Program provides funds to state agencies to help them improve their dam safety programs. The funding helps states carry out the essential functions of a dam safety program, including inspecting dams and permitting construction, rehabilitation, repair, alteration, and removal projects. The assistance is distributed among states based on numbers of dams that the state programs regulate. Defining this type of dam allows the federal agency to fairly determine how much each state should receive. (Please also see the answer to question number 6.)

8. According to the numbers in your testimony, clearly many states do not have enough employees to run even just an adequate state dam safety program. Can you give us an idea of what kind of numbers are appropriate?

According to the Model State Dam Safety Program (FEMA 316/March 1998) guidebook, an effective dam safety program would have approximately 10.3 full time equivalent (FTE) professionals on staff per 200 dams regulated. That would be about 20 dams per FTE. In reality, the number of dams per FTE is 387—nearly *20-times the recommended workload.*

As the attached *State Staffing and Workload* chart shows, staffing of most state dam safety programs falls alarmingly short of recommended guidelines. Currently, only the State of California maintains a dam safety staff that mirrors the 20 dams per FTE benchmark.

Based on the total number of state-regulated dams in the U.S., the number of people working full-time in state dam safety programs throughout the U.S. should be increased tenfold. To reach the Model State Dam Safety Program recommended staffing levels, about 3,200 more professionals would be needed in addition to the states’ existing total program staff of 353 FTE’s. What this means is that while each state on average has 7 dam safety program staff, they need an on average an additional 64 more professionals in order to have an effective program.

While the Federally recommended model staffing levels will likely never be obtained, the disparity is stunning. A need to strive for better staffed programs clearly exists.

9. Clearly there are several competing priorities for State Dam Safety Officials. What is the most immediate concern?

The one over-arching priority of the Association and state dam safety programs is to reduce the risk of loss of life and property damage caused by dam failures.

The Association cannot single out just one issue when we are so alarmed at the number of un-inspected dams, or the fact that only 50% of the dams have an Emergency Action Plan in place, or the huge unmet funding need of $10 billion for repairing the nation's critical dams.

The many issues that are immediate concerns must not be viewed as competing priorities, but as equally important challenges that must be addressed simultaneously.

10. Since most of our nation's 80,000 dams are owned by private companies and individuals. How engaged are the state dam safety programs?

While individual state dam safety program staff are typically very committed to the cause of their programs, many state dam safety programs are not as engaged as anticipated in the Model State Dam Safety Program (FEMA 316/March 1998) guidebook. It was noted in question number 8 that many states do not have enough employees to run comprehensive or even adequate dam safety programs. The benchmark-anticipated full time equivalent (FTE) professionals, are not on staff in most states. (See *State Staffing and Workload* chart.)

Within their unique safety regulation process, state dam safety program personnel routinely communicate with private owners. This job is daunting, as ownership of dams is sometimes unclear, owners cannot be located, and many owners are unresponsive.

Larger, for-profit owners are often more engaged in dam safety than the smaller owners, lake associations, or individual owners. The smaller non-profit or individual owners are often willing to take appropriate actions but lack adequate financial resources.

11. It is good to know the number of Emergency Action Plans (EAPs), used to notify and evacuate downstream populations in the event of a failure have increased. Are EAPs exercised regularly?

Failure to exercise an existing EAP for a high-hazard-potential dam is akin to an elementary school that does not practice fire drills—should an emergency occur, unnecessary confusion and loss of time are guaranteed. Requirements for the update and exercise of EAPs vary by state. While some states judiciously review and practice their plans, others do not.

Even worse, many states do not require EAPs. While there has been some progress, EAPs have been established for only about half of U.S. dams that pose a risk to human life..

All states should require the creation of EAPs—including identification of inundation zones and procedures for notification and evacuation—for high-hazard-potential dams. These EAPs should include requirements for conducting exercises; however, there must first be something to exercise.

Unfortunately, due to the lack of dam break inundation maps, many people who live in dam break inundation zones are completely unaware that their homes and their lives could be at risk.

12. H.R. 1150, the Rehabilitation and Repair Act of 2005, does not address the needs of 52,000 privately owned dams of which almost half may be in need of rehab. Some say there is a need at both federal and state levels to help private dam owners. Does anyone have any recommendations as to how to go about it?

A few states across the country have established innovative funding programs to assist dam owners. States with successful programs can serve as examples for other states to follow.

There is currently no broad-based program at the federal level to assist dam owners with the funding of needed repairs. The establishment of funding assistance by the federal government and individual states is an important step in mitigating costly disasters caused by the failure of unsafe dams.

ASDSO recommends establishment of a federal assistance program for private owners. This would be the most effective means of providing a long-term, stable funding source for dam rehabilitation. FEMA and/or the U.S. Army Corps of Engineers (the Corps) could be the lead federal agencies.

The federal-state relationships under the current National Dam Safety Program could be continued and expanded to include a funding mechanism.

Direct funding to states, municipalities and private owners would be the most effective mechanism. Funding could be accomplished in various ways: loans similar to a state revolving fund, or loan/bond guarantees which would be popular with privately owned dams.

ASDSO completed a research report entitled, *THE COST OF REHABILITATING OUR NATION'S DAMS: A METHODOLOGY, ESTIMATE & PROPOSED FUNDING MECHANISMS*, (December 2002) that describes recommendations on this issue.

Other concepts include the following:

- Requiring and guiding private owners to develop a maintenance/ rehabilitation trust or escrow fund for the life of the structure. New dams should be required to have such a fund.
- Encouraging private owners to look for ways (possibly through creation of conservancy districts, or just donations) to transfer ownership of their dams to public entities.
- Creating a low interest revolving loan fund program for private dams, in addition to the current grant program proposal for public dams.
- Allowing an individual income tax deduction or exemption for funds a private dam owner spends for dam safety improvements.

13. It appears that all of the witnesses support H.R. 4981, the Dam Safety Act of 2006 and H.R 1105, the Dam Rehabilitation and Repair Act of 2005. Do you all have any recommendations or suggestions for enhancements to these bills?

Many possible improvement recommendations have been mentioned in answers to previous questions. However, we cannot overstate the need for <u>full appropriation of both bills</u>. The national dam safety program in particular has not yet achieved even the limited vision of the enabling legislation, as appropriations have not matched authorized levels.

14. Federal agencies have been conducting vulnerability assessments and security improvements at federally owned dams. Some have asserted that the federal government has been slow at sharing this information with the states and private dam owners. Is this true? If so, why are there delays in sharing this critical information?

From a states' perspective, the federal government lacked a sense of urgency regarding the transfer of knowledge and techniques to improve dam security from federal agencies to state dam safety officials.

Following the terrorist attacks of 9/11, federal agencies took immediate, decisive steps toward exploring the vulnerability of dams to manmade attack and options to mitigate these vulnerabilities. Security experts completed vulnerability assessments on federal dams and labs were charged with conducting blast studies and other tests of dam security.

Although DHS has standing "sector coordinating councils" to facilitate communication between federal, state, and local governments and the private sector, the process is slow and unwieldy. Consequently, results of the laboratory studies and more practical data for improving on-site dam security are still not available to the states.

Differing state Freedom of Information policies have been cited as a major barrier to freely transferring this information from the federal level to the state level.

Another possible barrier is the number of federal agencies involved with dam safety and their actions immediately following 9/11. Several unique approaches to security upgrades resulted, and this lack of uniform procedures played a role in making the technology transfer process more challenging.

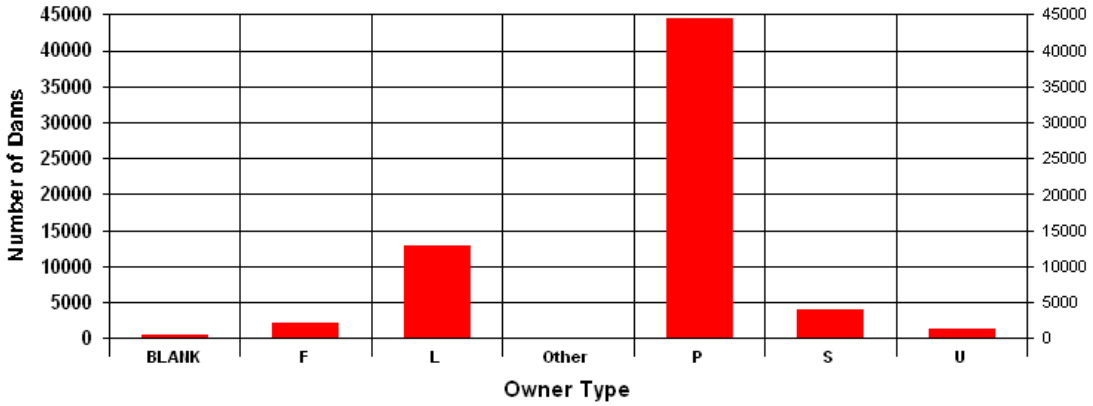
Whatever the cause, federal guidance on dam security issues, whether basic "best practices" policies or more detailed information, has been slow in coming to most state, local, and private dam owners.

State Dam Safety Program Staffing and Workload – 2005 Data *All data except for states marked with an asterisk is from the 2005 Dam Safety Program Management Tools (DSPMT) Report to the National Dam Safety Review Board. FTE=Full-Time-Equivalent Staff. Alabama has no dam safety program.*

State	Recommended FTEs per Model Program	Existing Total FTEs	Existing State-Reg Dams per FTE
Alaska	4	1	82
Arizona	13	9	28
Arkansas	20	4	115
California	63	60	21
Colorado	95	15	127
Connecticut*	2	4	177
Delaware	40	1	74
Georgia	7	9	429
Hawaii	22	2	77
Idaho*	73	8	57
Illinois*	50	5	305
Indiana*	173	5	199
Iowa*	296	1	2775
Kansas	52	7	827
Kentucky	27	14	75
Louisiana	42	8	67
Maine	19	2	554
Maryland	49	5	79
Michigan*	64	3	353
Minnesota	181	3	376
Mississippi	33	5	844
Missouri	144	5	131
Montana	111	5	549
Nebraska	32	6	391
Nevada	42	2	319
New Hamp.	85	8	106
New Jersey	20	20	85
New Mexico	93	6	66
New York	224	8	227
N. Carolina	57	16	280
N. Dakota	84	5	253
Ohio	60	13	134
Oklahoma	157	3	1509
Oregon*	2	2	547
Pennsylvania	33	24	131
Rhode Island	116	1	548
S. Carolina	117	3	927
S. Dakota	32	2	1566
Tennessee	351	8	81
Texas	33	7	1003
Utah	28	6	111
Vermont*	71	2	258
Virginia	48	5	284
Washington	18	8	116
West Virginia	179	6	60
Wisconsin*	71	6	571
Wyoming	4	5	283
	Recommended: 3537	**Actual: 353**	**Actual Average: 387** ***Recommended: 20***

2006 National Inventory of Dams (NID) Update Data Collection Results
Reporting Year: 2005
Prepared for ASDSO -- 3 March, 2006

Owner Type



F – federal
L – local
P – private
S – state
U – utility
(Blank – unknown)

Owner breakdown, as reported by states*:

Private businesses, utilities, or individuals - 64%

State governments - 5%

Local governments - 21%

*Federal agencies 3% - (This will increase to about 5%.)

Unknown (blank, invalid, or ownership in question) - approximately 5%

**Processing of federal agency reports is in progress.*

State-Regulated Dams and Emergency Action Plans (EAPs)

Dam Safety Program Management Tools National Dam Safety Review Board Report, 2005

SR = State regulated *HH = High Hazard Potential* *SH = Significant Hazard Potential*

State	SR HH dams	SR SH dams	SR HH w/ EAPs	SR SH w/ EAPs	% HH w/ EAPs	% SH w/ EAPs
Alabama	*NA – Alabama has no state dam safety program.*					
Alaska	18	32	7	15	39%	47%
Arizona	93	39	68	22	73%	56%
Arkansas	102	92	91	0	89%	0%
California	334	708	334	709	100%	100%
Colorado	340	330	329	316	97%	96%
Delaware	9	27	3	0	33%	0%
Florida	72	321	72	321	100%	100%
Georgia	437	NR	14	0	3%	NR
Hawaii	96	22	49	10	51%	45%
Idaho	96	141	92	34	96%	24%
Illinois	184	297	165	117	90%	39%
Indiana	241	250	6	1	2%	0%
Iowa	78	191	0	0	0%	0%
Kansas	183	247	91	14	50%	6%
Kentucky	177	213	6	0	3%	0%
Louisiana	29	65	21	4	72%	6%
Maine	25	80	23	48	92%	60%
Maryland	66	80	58	38	88%	48%
Michigan	79	133	77	128	97%	96%
Minnesota	39	154	35	0	90%	0%
Mississippi	310	81	32	2	10%	2%
Missouri	455	132	25	15	5%	11%
Montana	102	131	96	0	94%	0%
Nebraska	129	212	116	7	90%	3%
Nevada	147	124	93	4	63%	3%
New Hamp.	89	193	87	133	98%	69%
New Jersey	202	366	191	222	95%	61%
New Mex.	170	92	13	0	8%	0%
New York	384	757	201	53	52%	7%
N. Carolina	1006	657	195	25	19%	4%
N. Dakota	28	92	12	1	43%	1%
Ohio	411	559	145	110	35%	20%
Oregon	122	181	72	15	59%	8%
Pennsylvania	785	257	692	118	88%	46%

Puerto Rico	34	1	34	0	100%	0%
Rhode Island	17	41	2	1	12%	2%
S. Carolina	153	481	153	481	100%	100%
S. Dakota	47	144	30	6	64%	4%
Tennessee	148	205	148	5	100%	2%
Texas	815	758	87	12	11%	2%
Utah	188	203	182	50	97%	25%
Vermont	57	133	14	29	25%	22%
Virginia	136	278	118	156	87%	56%
Washington	145	196	114	59	79%	30%
West Virginia	267	75	182	57	68%	76%
Wisconsin	214	190	92	17	43%	9%
Wyoming	79	116	33	5	42%	4%
Total	**9338**	**10,077**	**4700**	**3360**	**Av: 57%**	**Av. 18%**

Survey of ASDSO State Reps, August 2006

Cross-Border Effects of Dam Failures

1.Would failure of any state-regulated dams in your state adversely affect neighboring states?
2. Which states have dams that pose a potential dam break threat to your state?

State	***1. Would failure of any state-regulated dams in your state adversely affect neighboring states?***	***2. Potential threat from:***
AL	*(Alabama has no state dam safety program.)*	GA, TN
AK	Canada is planning to build a dam that would put Alaska at risk if it failed. A 902' high dam which would become the fifth tallest dam in the world is under permit review on a tributary of the Stikine River adjacent to Wrangell, Alaska. There is no threat to Canada from dams in Alaska.	Canada
AZ	Luna Dam is a significant hazard dam in Arizona, the failure of which would result in property damage in **New Mexico**.	NV, UT
AR	Little Flint Creek Dam located in Benton County, Arkansas, S18,T18N,R33W, if failed would impact Flint Ridge, **Oklahoma**. Normal volume of reservoir is 18300 acre-feet. Lake Erling Dam located in Lafayette County, Arkansas, S31,T19S,R23W, if failed would impact Springhill, **Louisiana**. Normal volume of reservoir is 2350 acre-feet.	MO, OK
CA	We have very few dams that are on the border. Four dams would impact **Nevada**.	NV
CO	Failure of dams in Colorado (12-18 dams that vary in hazard classification from high to significant) could affect **UT, NM, WY, NE, and KS**. The impacts would vary in magnitude from substantial flooding with damage and potential life lost to high channel flows. Colorado River: The only non federal dam on the main stem Colorado River is Dillon, Owned by Denver Water. It will affect Utah with a flow of about 5 times that of the historic peak flow in 1984 of 70,000 cfs. The only significant population center in Utah that would be significantly affected is Moab, in Colorado several cities would be impacted. Taylor Draw Dam (Kenny Reservoir) on the White River at Rangely is about 20 miles from the Utah border. Utah is pretty much uninhabited in this area. Some ranches along this stretch may be affected. Baxter Dam (McAndrews Lake) is now restricted, we are having some problems with the owner maintaining reduced reservoir levels (court action is pending). Failure could damage the Baxter Pass Road south of Bonanza, Utah. The dam is about 10 or 12 miles from the state line and about 30 or 35 miles up from the confluence with the White River in Utah.	NM, UT

	Lower Big Creek, Three Mile, and Ginger Quill Dams are just out of Wyoming in the North Platte River Basin with mainly ranch land downstream. Many more low hazard dams could affect adjoining states, but the impact would probably be minimal.	
CT	There are one or two small dams in the northwest part of the state that could minimally affect **New York**.	MA, NH, NY
DE	(no response)	
D.C.	*Response from MD: Looking at Wash DC using VirtualEarth.com, there are three large reservoirs. They are: Dalecalia Reservoir, northwest DC, on the border with MD Georgetown Reservoir, west side of DC adjacent to Potomac River McMillan Reservoir, near Howard University in the center of DC* *Except for Dalecarlia, which I knwo is operated by the Corps of Engineers as part of the National Aqueduct system, I don't know if they have dams associated with them or if anyone is looking at them.*	
FL	No rivers flow out of Florida.	
GA	Yes, the failure of Buford Dam, which impounds Lake Lanier, could cause a domino effect of dam breaks on the Chattahoochee River, which is the border between Georgia and **Alabama**. Up north, failure of a federal dam (TVA's Blue Ridge Dam) could cause flooding in both **Tennessee** and **North Carolina**.	TN
HI	NA	NA
ID	Failures of approximately 18 Idaho dams could impact **Wyoming, Utah, Oregon and Washington.** Loss of life and extensive property damage is likely to occur. Most of these dams are federally owned or regulated, but a few are privately owned. The dams are: ID00077 Twin Lakes Dams — ID00457 Smoky Canyon No. 2 — ID00056 Brownlee Dam ID00068 Oneida Dam — ID00375 Texas Basin Dam — ID00057 Oxbow Dam ID00175 Glendale Dam — ID00278 Deer Flat Dams — ID00055 Hells Canyon Dam ID00071 Lamont Dam — ID00280 Arrowrock Dam — ID00054 C J Strike Dam ID00074 Weston Dam — ID00279 Anderson Ranch Dam — ID00287 Dworshak Dam ID00079 Foster Dam — ID00288 Lucky Peak Dam — ID00319 Albeni Falls Dam	NV, UT, WY
IL	I do not think any Illinois dams would materially impact other states. Might be a couple in Wisconsin that would impact Illinois . With large rivers on 3 sides (well 2.75) our water just blends in when it reaches the border.	IN, WI
IN	Staff estimates that there are at least 5 non-federally owned dams in Indiana that might adversely affect an adjacent state if they failed. The states impacted would be **Illinois, Michigan and Ohio.** One additional dam in Indiana impounds a lake (500+acre) located mostly in an adjacent state. Although the breach wave from this dam would damage Indiana, the loss of the lake could have a significant economic loss in the adjacent state. There is one federally owned dam that would likely affect an adjacent state. Since Indiana does not require breach	MI, OH

	inundation studies, the potential damage and loss of life in the adjacent state would be difficult to estimate.	
IA	Failure of Lake Rathbun Dam would impact **Missouri.** The Rathbun Dam is owned and operated by the US Army Corps of Engineers. It is not regulated by the state of Iowa.	NE, WI
KS	Several small non-federal dams along the borders of **Nebraska, Missouri**, and **Oklahoma** could adversely affect the bordering states with minor flooding and potentially some economic loss. There are two larger dams located on streams that cross the Missouri line that could impact the state of Missouri more significantly due to the size of the structures. However, we have no reason to believe that failure of these two dams would be a threat to life in Missouri. One of these dams is located in Cherokee County. It is a low head dam owned by the Empire District Electric Company on Spring Creek three stream miles from the Missouri line. There other dam is located in Linn County and is owned by Kansas City Power and Light Company. It is located approximately 17 stream miles from the Missouri line on the North Sugar Branch of the Marais Cygnes River. It is 76 feet high and impounds 85,000 acre-feet of water at the top of dam. We have not attempted to evaluate federal dams which might impact border states.	NE, OK
KY	Should it fail, Wolf Creek Dam, a federal dam which impounds L. Cumberland, would have a devastating and widespread impact on **Tennessee**. KY has no dams on the state inventory that would affect a neighboring state. Surface Mining may have some. *(Coal waste dams not included in estimate – Martin County tailings impoundment failure of Oct. 2000 contaminated the Big Sandy River, affecting **WV**, possibly other states..)*	VA
LA	Two federally regulated dams would affect parts of **Texas**. One is Caddo Lake (USACE) and the other is Toledo Bend (FERC).	AR, TX
ME	Several of the Federal Dams including FERC-regulated structures most certainly would affect other states. There are 4 dams upstream of NH and 11 dams upstream of **Canada** . Twenty-one dams are on the NH/ME border (Salmon Falls River), and four are on the Canada/ME border (St Croix River). Altogether, 15 dams upstream of NH or Canada could cause cross-border damages. Some could be very bad. Aziscohos for instance could conceivably take out most **NH** Towns along the Androscoggin River.	NH
MD	Yes, 6 dams that could impact **WV, VA, and PA**. Failures could cause property damage and may result in loss of life. The dams are: Dam/Reservoir Names: Ft. Ritchie/Lower Lake Royer (Dam No. 70), Jennings Randolph (Dam No. 69) Savage (Dam No. 14), Frostburg Reservoir (Dam No. 9), Potomac River Dam Nos. 4 and 5 (Dam Nos. 78 & 138).	DC, PA
MA	*NH response: Lastly, I know that the two dams in Massachusetts that are part of the field trip for the Boston Conference would also impact other states if they were to fail. The failure of the Wachusett Dam would cause significant flooding along the Nashua River in **New Hampshire**, and the Quabbin Reservoir Dams would cause significant flooding in **Connecticut.***	NH, NY
MI	We estimate there to be about 13 Michigan dams that could impact our neighboring states with 12 potentially impacting **Wisconsin** and 1 impacting **Indiana**.	IN, WI
MN	We don't think failure of any high hazard dam regulated by Minnesota DNR would result in adverse impacts in other states or Canada. Failure of some of the low or significant hazard dams may cause some damages in adjacent states, but we don't have information available	WI

<table>
<tr><td></td><td>to provide a good answer to that question.</td><td></td></tr>
<tr><td>MS</td><td>No</td><td></td></tr>
<tr><td>MO</td><td>Yes, 3 state regulated dams (2 HH, 1LH) would affect Oklahoma & 4 (1 SH, 3 LH) would impact Arkansas:

<table>
<tr><th>ID # \</th><th>Dam Name</th><th>County</th><th>Ht (Ft)</th><th>Surf Area of Lake (Acres)</th><th>Haz Class</th><th>State Impacted</th></tr>
<tr><td>MO20511</td><td>Lost Creek E-1</td><td>Newton</td><td>46</td><td>90</td><td>1</td><td>Oklahoma</td></tr>
<tr><td>MO20781</td><td>Lost Creek A-1</td><td>Newton</td><td>49</td><td>55</td><td>1</td><td>Oklahoma</td></tr>
<tr><td>MO20354</td><td>Fisher Lake</td><td>McDonald</td><td>40</td><td>20</td><td>3</td><td>Oklahoma</td></tr>
<tr><td>MO31953</td><td>Fourche Creek #8</td><td>Ripley</td><td>49</td><td>55</td><td>3</td><td>Arkansas</td></tr>
<tr><td>MO31778</td><td>Fourche Creek #9</td><td>Ripley</td><td>44</td><td>23</td><td>3</td><td>Arkansas</td></tr>
<tr><td>MO31860</td><td>Fourche Creek #11</td><td>Ripley</td><td>45</td><td>69</td><td>3</td><td>Arkansas</td></tr>
<tr><td>MO31408</td><td>Fourche Creek #7</td><td>Ripley</td><td>68</td><td>170</td><td>2</td><td>Arkansas</td></tr>
</table></td><td>IA, NE</td></tr>
<tr><td>MT</td><td>For the most part, Montana state boundaries fall on a drainage divide to the south. Near the north, there are a few reservoirs that flow into Canada (Lake Sherburne comes to mind). The only dam I know that has an interstate inundation area is Noxon Rapids Dam which extends into Idaho (FERC regulated dam).</td><td>ID, Canada</td></tr>
<tr><td>NE</td><td>The failure of 3 dams in Nebraska could affect neighboring states: Gavins Point Dam (SD01094), Harlan County Dam (NE01066), and Kingsley Dam (NE01048).

The failure of Gavins Point Dam, located across the Missouri River on the Nebraska-South Dakota border, could affect towns along the Missouri River in Nebraska, South Dakota, Iowa, and Missouri.

The failure of Harlan County Dam, located on the Republican River in south-central Nebraska, could affect towns along the Republican River in Nebraska and Kansas and along the Kansas River in Kansas.

A breach routing analysis of Kingsley Dam (when full) was carried downstream to the point where the Platte River empties into the Missouri River on the Nebraska-Iowa border. At that point, the Platte River would still be one foot above the 500-year flood level, so I imagine that could cause some additional downstream flooding along the Missouri River in Nebraska and Iowa.

The extent of the flooding downstream of Gavins Point Dam would depend on if the flooding was only due to a failure at Gavins Point Dam, a failure in series of Fort Randall Dam and Gavins Point Dam, or a failure in series of Oahe Dam, Big Bend Dam, Fort Randall Dam, and Gavins Point Dam. Using the worst-case scenario, towns in South Dakota that could be flooded include: Yankton (part of the town), Vermillion (part), Akron (part), Westfield (part), North Sioux City (all of the town), and Riverside (all). Towns in Iowa that could be flooded include: Sioux City (part), Sergeant Bluff (all), Salix (all), Sloan (all), Hornick (all), Whiting (all), Onawa (all), Turin (all), Blencoe (all), Little Sioux (all), Mondamin (all), Modale (all), Missouri Valley (part), Carter Lake (all), Council Bluffs (most), Pacific Junction (all), Glenwood (part), Bartlett (all), Percival (all), Thurman (part), Riverton (part), and Hamburg (most). Towns in Missouri that could be flooded include: Watson (all), Phelps City (all), Corning (all), Craig (all), and Mound City (part).</td><td>WY</td></tr>
</table>

	Towns in Kansas that could be flooded due to a failure of Harlan County Dam include: Republic (part), Scandia (most), Concordia (part), Clyde (all), Clifton (part), Morganville (all), Clay Center (part), Wakefield (part), Milford (all), Camp Forsyth (all), Junction City (part), Fort Riley (all), Ogden (part), Manhattan (a small part), Belvue (all), Rossville (all), Perry (most), and Lawrence (part). I would guess that a failure of Kingsley Dam could cause some flooding in Iowa at Pacific Junction and Bartlett.	
NV	Dams on both forks of the Owyhee River (small argument with BIA over jurisdiction on some) flow into rural **Idaho**; Boulder and Davis Dams on the Colorado River (technically not state Regulated as they are under BuRec) affect **Arizona** and **California**, as well as **Mexico**; a few small dams that have unknown but likely minimal threats to **Oregon, Utah, California** and **Idaho**. There are federal dams in CA that would greatly impact northern NV.	CA, UT
NH	New Hampshire has 5 significant hazard dams on the Salmon Falls River, the border between **Maine** and New Hampshire in the southern parts of the States, whose failures would have impacts on roads and residences in Maine. There are 6 high hazard and 2 significant hazard dams on the Connecticut River, the boundary between New Hampshire and **Vermont**. Several different Vermont municipalities could be impacted upon dam failure. One of the high hazard dams on the Connecticut River (the Moore Reservoir) would also impact Massachusetts, in addition to Vermont, if it were to fail. There is one high hazard dam on the Spickett River whose failure could have impacts on roads and homes in **Massachusetts** if it were to fail. The Corps inundation maps for their flood control dams that are located in NH don't extend to Massachusetts, but based on the depth of flooding where they do terminate, I estimate that the failure of the Everett Dam and the Franklin Dam would impact Massachusetts and the failure of their Surry Mountain and Otter Brook Dams would impact Vermont and Massachusetts. Also, in addition to the dams that Bethann mentions on our border with Maine, there are several dams on the Androscoggin River in New Hampshire that would impact Maine if they were to fail, but I believe Tony Fletcher has already described them in his narrative.	ME, MA, VT
NJ	Yes, we have three dams that could impact **PA** and **NY**. Of the three, one dam would result in major flooding along the Delaware River. Merrill Creek Reservoir and Yards Creek Reservoir impact PA and Wawayanda Lake impacts NY. NJ is aware of 7 reservoirs in PA that would have an impact in NJ and 7 reservoirs in NY that also would result in significant flooding along the Delaware River.	NY, PA
NM	Costilla Dam, on the Rio Costilla, is a large high hazard potential earthen dam where failure would impact **Colorado**. Ute Lake Dam is a large significant hazard dam where failure would impact **Texas.**	AZ
NY	Yes - there are several dams which impound the upper Delaware River. Some of these are state-regulated. Others are FERC licensed, but may become state regulated if the owner applies for license surrender. There are also about 5 other High Hazard dams with inundation areas in other states to the east and south of New York, namely **NJ, CT, MA, VT, PA.**	NJ, VT

	Swinging Bridge Dam - has been in the news due to a depression that formed on the dam's crest in May 05 (currently FERC regulated). Repairs are in progress under FERC regulatory authority. Failure could affect communities on the Delaware River in NY, PA, and NJ. 2 NYC water supply dams on the upper Delaware River (Cannonsville Dam and Downsville Dam) - failure could affect communities along the Delaware in NY, PA, and NJ. *(NJ Response: NJ is aware of 7 reservoirs in PA that would have an impact in NJ and 7 reservoirs in NY that also would result in significant flooding along the Delaware River.)*	
NC	We are researching the data to find the North Carolina Dam Safety Program high hazard dams that could affect other states. At this time, I know of four major state regulated dams that could cause damage in **South Carolina**: • TRANS-024, Toxaway Lower Dam, Toxaway River, 21,000 acre-feet, damage would be • environmental upstream of and in Lake Jocassee. • POLK-009, Turner Shoals (Lake Adger) Dam, Green River, a tributary to the Broad • River, 16,000 acre-feet, loss of life and damage to property and • infrastructure possible in South Carolina. • RUTHE-003, Lake Lure Dam, Broad River, 45,000 acre-feet, loss of life, damage to • property and infrastructure possible in South Carolina • CLEVE-018, Moss (Kings Mountain) Lake Dam, Buffalo Creek, a tributary to the Broad • River, 51,000 acre-feet. Loss of life and damage to property and • infrastructure in South Carolina possible. • CLEVE-044, Hughs Lake Dam • CLEVE-003, Kings Mountain City Lake Dam #2 • CLEVE-013, Kings Mountain Lake Dam #1 • MECKL-023, Arrowood • ANSON-026, Bonsal Tailings Dike • HENDE-107, Headwaters Saddle Dam (I will need to add the saddle dike separate from the main dam. Saddle dike is what may affect SC) **Dams Regulated by the North Carolina Utilities Commission that would affect South Carolina:** HENDE-001, Summit Lake, Green River, a tributary to Broad River **Dams that may affect Virginia:** • ALLEG-010, Mountain Lake Dam • WATAU-027, Beech Mountain • NCUC Regulated Dams that could affect Virginia:	GA, VA

	• Lake Hyco, Hyco River • Lake Mayo, Mayo Creek • Belews Creek Dam, Dan River	
ND	Yes, two or three dams would impact **South Dakota**. Not sure how bad it might be, probably a few homes. Other states whose dams could potentially impact North Dakota include Montana, South Dakota, Minnesota, though I'm not aware of any. I'm quite sure there are a couple of dams in Canada could impact ND.	MT, MN, SD, Canada
OH	On the west side, we have Grand Lake St. Marys , and if that goes, it will affect **Indiana.** On the northeast side, the Mahoning River flows into PA. The inundation mapping for Lake Hamilton indicated shallow flooding along the Mahoning in **PA**. Also, Lake Evans, which is upstream of Hamilton and would cause Hamilton to fail, should be included. USACE structures contributing to the Mahoning include Mosquito Creek, MJ Kirwin (West Branch), and Berlin. Impact from Lake Milton and Meander Creek dams is unknown because of lack of inundation mapping. These five are 20-45 miles from the border.	IN, PA
OK	Yes, about 10 dams could affect **Arkansas, Texas, and Kansas**, with loss of up to 50 lives.	AR, MO, TX
OR	Several of the Federal Dams including FERC-regulated structures most certainly would.	ID, NV
PA	Yes. We have state regulated dams and federally regulated dams that would impact areas in other states if they failed. We estimate that we have 21 state regulated dams that would impact other states upon failure. The states are **New York, Ohio, West Virginia, Maryland and New Jersey**. Probably the two dams that would cause the largest impact in other states if they failed are Thomas W. Koon Dam and Lake Gordon Dam. These two dams are located back-to-back on Evitts Creek in Bedford County, Southern Pennsylvania. They are water supply dams owned by the City of Cumberland, Maryland. Failure would impact the Cumberland metro area with a population of up to 1000, one school and one assisted care living facility potentially impacted. *(NJ Response: NJ is aware of 7 reservoirs in PA that would have an impact in NJ and 7 reservoirs in NY that also would result in significant flooding along the Delaware River.)*	MD, NJ, NY, OH, WV
PR	NA	NA
RI	No	
SC	SC and Georgia are separated by the Savannah River and any State Regulated Dam failure in either state would probably not have any adverse impact.	NC
SD	No state-regulated dams that would adversely affect other states.	NE.

		ND, WY
TN	Windstone Dam in Hamilton County, TN is about 1/2 mile above the state line and would cross into Catoosa County, **GA**. It might cause flooding of a road and some private property, although no loss of life would be expected. I did not include any Corps or TVA dams. A number of them would probably have **multi-state effects**. Nickajack Dam in TN just above the **Alabama** line would. A number of TVA dams in NC and VA probably would affect TN.	GA, KY, NC, VA
TX	Yes, there are two dams that could affect **Louisiana and Oklahoma**. One of the dams is Toledo Bend Dam on the border of Texas and Louisiana. It has a FERC license but is still a state-regulated dam. It is the largest body of water in Texas. Failure could affect a considerable number of people in both states. The other dam is Palo Duro Dam in the panhandle. Consequences would be less. There are 2 dams on the Rio Grande, both owned by the International Boundary and Water Commission, so they are not state-regulated. both would have major impact on **Mexico** if they would fail.	LA, NM, OK, Mexico
UT	A dozen or so would affect **Wyoming, Idaho, Nevada, Arizona, Colorado**. Several could involve loss of life, but mostly it is property damage. Woodruff and Long Park dams would substantially affect Wyoming The **Quail Creek failure affected Arizona and Nevada in 1989** and Sand Hollow Dam would do the same today.	ID, NV, WY
VT	Yes. Many, say a dozen—not counting some that drain into **Quebec**, and several on the Connecticut River between **NH** and VT. Harriman dam, VT00025 is above the mothballed Yankee Rowe nuclear powerplant in Mass. Pownal Tanning Dam VT00220, is expected to have some truly nasty sediments that would be **New York** bound	NH, NY
VA	It is believed that flooding could be caused in **North Carolina, West Virginia, Kentucky and Tennessee**. Of course we are talking primarily for short distances into those states and probably minimal flooding.	MD, NC
WA	None	ID
WV	Yes, at least one. Lake Lynn Dam near Morgantown WV. (ID#: WV06128) would affect Pt. Marion, **Pennsylvania** if it failed. (Map available) *(KY included in next column because of coal waste dams, which are not considered in this estimate.)*	*KY*, MD, PA, VA
WI	Yes, the most significant potential for adverse impact are from failure of dams on the Menominee or Montreal Rivers between Wisconsin and Upper **Michigan**, or on the Mississippi and St. Croix Rivers between Wisconsin and **Minnesota/Iowa**. All of these dams, except for the Saint Croix Falls Dam, are regulated by FERC or the Corps. Saint Croix Falls Dam is a high hazard state regulated dam that could affect developed areas along the St. Croix River in Minnesota. There are about a dozen dams on rivers that originate in Wisconsin and flow into northern **Illinois** that could case some property damage but would not likely cause loss of life.	MN, IL (state regulated) MI, IA (FER

		C or Corps regulated)
WY	6 federal and 2 private dams in WY could affect parts of **Nebraska, Idaho, South Dakota and Utah**. Other than the 2 biggest federal dams, no dollar amounts have been calculated.	ID, UT

Potential International Impact	
Canada	Dams in ME, MT & VT could affect Canada. Canadian dams could threaten AK.
Mexico	Dams in NV & TX could affect Mexico, and Mexican dams could affect TX. Warren Samuelson, head of dam safety in TX, was notified on Aug. 8, 2006 of an unsafe dam in Juarez, Mexico. The Army Corps of Engineers had inspected the dam and declared the dam unsafe and could breach at any time. If a dam breach occurs it will cause serious flooding in downtown El Paso. Precautionary evacuations of 1500-2000 people were ongoing. Two ports of entry had been closed. The Texas Department of Public Safety was assisting with evacuations and monitoring as the City of Juarez is pumping water out of the dam. Although TX does not have jurisdiction, this is an example of a dam that could have devastating effects on an area on the other side of a border.

Selected Dam & Levee Failures and Incidents in the U.S. from 2000-2006
Association of State Dam Safety Officials (www.damsafety.org)

Date	Dam	Location	Reported Effects to the Public	Property Damage Overview	Comments
7/28-29, 2006	Needwood Dam	Gaithersburg, MD	2,200 + evacuated for 3 days	NEAR FAILURE	65' high, 40-year-old earth dam sprang 7 leaks at toe; lake reached 23' above flood stage
6/7/2006	Geary levee	Upper Klamath Lake, Oregon		Flooded Highway 140 & 2,000 acres of farmland, $4.5 M to repair highway.	
3/14/2006	Kaloko Reservoir Dam	Island of Kauai, Hawaii	7 deaths	Extensive environmental damages, several homes destroyed, crops destroyed	Earth dam built in 1890
12/14/2005	Taum Sauk	Lesterville, MO	3 children critically injured	Toops family home demolished; family of 5 swept away. State highway washed out; at least 3 trucks swept from road.	Instrumentation failure caused to much water to be pumped into reservoir
10/18/2005	Whittenton Pond Dam	On Mill R., Taunton, MA	2,000 + evacuated, including a housing development for the elderly	NEAR FAILURE	173-year-old wooden dam , about 100' across, about 12' high,
9/2005	Levees	New Orleans, LA	About 1,500 deaths	Billions in property damage	
7/2/2005	Hadlock Pond dam	NY	At least 4 homes destroyed, about 12 with moderate to severe damage	Roads washed out, power outages. State Rte 149 closed, major link between upstate NY & VT. About $1Million in damages.	Embankment dam completed 5/05. 220-acre lake, 12-15' deep. Heavy rain during first filling caused piping failure. Suspected construction flaw.
11/24/2004	Keith Lake dam	St. Clair County, near Odenville, Alabama	Downstream homes evacuated	Decreased property values, environmental damages, ~20% damage to downstream dam	Lake ~1200 yards long, 450 yds wide, 40' deep. 60-70' earth dam. Earth dam. Failure not covered by media.
10/11/2004	Victor Lake (aka Upper Stinchomb)	Fayette County, Georgia	They had to rescue around 20 people.	Approximately 20 trailers received damage.	15 acre lake that failed suddenly and flooded part of a trailer park.
7/13/2004	21 dams failed. Another 26 dams damaged.	South New Jersey	350 homes flooded	Extensive, >$30 million estimate	Heavy rains, 13" in 12 hrs
7/3/2004	Small earth dam	Decatur, Arkansas		At least 5 businesses damaged	Heavy rains, 5-6"
6/3/2004	Levee – Upper Jones Tract	Near Stockton, CA	About 20 houses affected	Thousands of acres of crops destroyed. Declared federal disaster,	350-foot section washed out.

				with $90 million in damage.	
5/4/2004	Lake Susan dam	Montreat, North Carolina	Several homes evacuated	The Montreat Conference Center, owner of the 79-year-old dam, plans to repair the dam and has raised $900,000 for repairs.	Collapse of a 35' section of the dam's upstream wall.
4/24/2004	Small earth dam on 10-acre lake	Pearl County, Mississippi	2 homes flooded, 1 car swept off road		Heavy rains, 6-10", dam near Anchor Lake subdivision, between Picayune and Poplarville
3/12/2004	Big Bay Lake dam	Near Purvis, Southern Mississippi	98 homes damaged or destroyed	2 churches, fire station, and bridge damaged or destroyed; SBA estimate: >$2.2 million. $2.5 million dam, > $50K Red Cross	900 -1,100 acre lake; 3.5 billion gallons; quarter-mile-wide flood path extending at least 17 miles downstream
8/9/2003	Private dam	Penn Run, Indiana County, W. Pennsylvania	Up to 200 campers evacuated from Yellow Creek Camp Ground		A private dam about three miles upstream overtopped.
6/22/2003	Lake Manatee gate failure	Florida	2 homes destroyed; 600 homes evacuated		Dam did not fail; gate stuck in closed position, causing lake to swell beyond its banks.
6/14/2003	Polk Township dam	Polk Township, Pennsylvania	20 homes evacuated, nursing home put on alert while the dam was stabilized.		Officials also concerned about Twin Lakes Dam in Smithfield Township;.
5/27/2003	Lake Upchurch and McLaughlin Lake dams	North Carolina		Lake Upchurch dam reconstruction costs estimated at more than $350,000.	4 additional dams damaged; another 16 overtopped during rainfall event (4-6" in less than 24 hrs)
5/26/2003	Hope Mills	Hope Mills, North Carolina	1,600 evacuated	est. $2.1 M damages; estimated cost of rebuilding dam: $6M	Heavy rains, stuck dam gate
5/13/2003	Silver Lake & Tourist Park dams	Near Marquette, Michigan		$102 M, incl $127,000 in emergency/ public safety, $3 M in roads/ bridges, $10.4 M in utilities, $4 M fisheries, soils & trees & $84 M in economic loss	Silver Lake fuse plug failure, resulting overtopping & failure of Tourist Park dam
5/7/2003	privately owned dam	East Ellijay, Georgia	6 houses evacuated, 3 trailers damaged.		Heavy rains
5/5/2003	Rumph's Pond dam (private, low hazard)	Dorchester County, South Carolina		Minimal damage to Norfolk Southern Railway property; about $144,000 in damages to the dam	Sabotage suspected; criminal charges filed. 21-acre lake, 13' high dam, 70 acre-foot impoundment
9/2002	Windy Hills	Harrison	Man died		

	Lake dam	County, Mississippi	after driving around a barricade placed at a washout from the failure.		
8/12/2001	Hearns Pond Dam	Delaware		$500,000. Washout of U.S. 13A near Seaford, Delaware.	Heavy rain
10/11/2000	Massey Energy coal waste impoundment	Martin County, Kentucky		300 M gals of slurry released into the Big Sandy and Ohio rivers.	Dam did not fail but bottom of impoundment collapsed into mine shaft.