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What is the National Dam Safety Program Act and Why Should It Continue?

FEMA's National Dam Safety Program is vital for the continuing progress toward improved public safety and mitigation of disasters from dam failures.

What is the National Dam Safety Program?

The National Dam Safety Program Act was signed into law on October 12, 1996 as part of the Water Resources Development Act of 1996.

In summary the program was established to improve safety around dams by 1) providing assistance grants to state dam safety agencies to assist them in improving their regulatory programs; 2) funding research to enhance technical expertise as dams are built and rehabilitated; 3) establishing training programs for dam safety inspectors, and; 4) creating a National Inventory of Dams.

Additionally, the act calls for FEMA to provide education to the public, to dam owners and others about the need for strong dam safety programs, nationally and locally, and to coordinate partnerships among all players within the dam safety community to enhance dam safety.

What Is the Current Funding Level?

FEMA's authorized funding level is $5.9 million. This breaks down in the Act as follows: 1) $4 million for state dam safety program assistance grants; 2) $1 million for dam safety research; 3) $500,000 for technical training for state dam safety inspectors; and, 4) $400,000 for FEMA's salaries and expenses.

What Is the Recommended Funding Level?

ASDSO recommends that the re-authorization of the Act should include annual appropriations of $6 million for state dam safety program assistance grants and $1.5 million for research including a comprehensive Information Technology System for the dam safety community. It is recommended that administration of the program receive $600,000 while the training funding level remain the same.

Why Should It Continue?

The National Dam Safety Program has been operational since 1998. Since that time, many success stories can be told. While progress is being made, still the fundamental goals of this program have

yet to be completely realized. The modest yet vital funding given to this program helps significantly to reduce the risks to life and property due to dam failures.

Failures and devastation still occur and threaten this nation as dams continue to age and deteriorate and as downstream populations grow. Failures can affect large populations, may flood into neighboring states and may cost millions of dollars in federal disaster relief spending.

Most failures occur at dams that are determined to be deficient or unsafe. There are approximately 2,082 unsafe non-federal dams in the United States. This means the state has identified deficiencies that leave these dams susceptible to failure.

The priority on rehabilitating our aging and deteriorating national infrastructure must include dams. Dams provide people with tremendous everyday benefits such as drinking water, electricity, protection from floods, wetlands areas, recreation and irrigation.

Attached is a chart showing general statistics about the number of dams in your state and the size of the state's dam safety program.

NDSPA Accomplishments

NDSPA Assistance Grants to State Regulatory Programs Made the Following Possible:

- Dam safety-related training for state personnel and training in the field for dam owners to conduct annual maintenance reviews
- Purchase of equipment, including state-of-the-art computer systems and software; new equipment to aid in engineering analysis; video inspection cameras to inspect conduits through dams; laptop computers for use in the field to complete inspection reports and other correspondence; surveying equipment; a four-wheel drive vehicle on which to mount a survey unit; and a TV-VCR to review conduit inspection videos
- Revision of state maintenance and operation guidelines
- Increase in the number of dam inspections
- Increase in the submittal of Emergency Action Plans (EAP)
- Increase in the turnaround time on the review and issuance of permits
- Improved coordination with state emergency preparedness officials
- The testing of EAP procedures through actual simulations of dam failures
- Use of helicopters to reach some remote dams for inspections, and to reduce travel time to other dams for inspections
- Improvements to dam inventory databases
- Improved telecommunications
- Identification of dams to be repaired or removed
- Conduct of dam safety awareness workshops
- Creation of dam safety videos and outreach materials
- Development of a public relations plan and a dam safety newsletter

State Assistance Amounts through FY 2002

STATE	Total State Assistance Grant (from FY98-FY02))	Number of Dams Meeting NID Definition
Alabama	$0	**1,570***
Alaska	$112,324	**112**
Arizona	$130,843	**315**
Arkansas	$157,811	**927**
California	$280,791	**523**
Colorado	$330,607	**1,666**
Connecticut	$202,245	**707**
Delaware	$94,351	**73***
Florida	$183,005	**678**
Georgia	$631,703	**4917**
Hawaii	$118,691	**129**
Idaho	$159,357	**343**
Illinois	$280,257	**1,232**
Indiana	$229,213	**1,463**
Iowa	$423,456	**3233**
Kansas	$992,576	**6,077**
Kentucky	$247,527	**1012**
Louisiana	$144,942	**381**
Maine	$192,198	**617**
Maryland	$152,106	**287**
Massachusetts	$325,251	**1,528**
Michigan	$203,799	**869**
Minnesota	$223,966	**932**
Mississippi	$593,107	**3,328**
Missouri	$189,641	**4,088**
Montana	$509,441	**3,523**
Nebraska	$395,736	**2,078**
Nevada	$161,613	**323**
New Hampshire	$212,013	**613**
New Jersey	$307,762	**824**
New Mexico	$165,560	**533**
New York	$430,227	**1,970**
North Carolina	$651,658	**2,851**
North Dakota	$183,060	**799**
Ohio	$351,921	**1,766**
Oklahoma	$745,806	**4,523**
Oregon	$259,440	**833**
Pennsylvania	$279,410	**1,412**
Puerto Rico	$105,329	**36**
Rhode Island	$135,981	**185**
South Carolina	$424,436	**2,252**
South Dakota	$396,560	**2,443**
Tennessee	$184,474	**1,135**
Texas	$1,078,772	**6,838**
Utah	$178,777	**654**
Vermont	$149,160	**348**
Virginia	$178,087	**1,597**
Washington	$174,066	**653**
West Virginia	$145,062	**537**
Wisconsin	$239,939	**1,291**
Wyoming	$292,522	**1,216**
TOTAL	$14,936,579.00	76597

* Last state report to NID was in 1979-1980

** Dam Safety budget not separate from departmental budget

National Inventory of Dams Definition of a Dam: Any artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water, that-
(i) is 25 feet or more in height from- (I) the natural bed of the stream channel or watercourse measured at the downstream toe of the barrier, or (II) if the barrier is not across a stream channel or watercourse, from the lowest elevation of the outside limit of the barrier, to the maximum water storage elevation; or.
(ii) has an impounding capacity for maximum storage elevation of 50 acre-feet or more, but does not include—
(i) a levee; or
(ii) a barrier described in subparagraph (A) that- (I) is 6 feet or less in height regardless of storage capacity; or (II) has a storage capacity at the maximum water storage elevation that is 15 acre-feet or less regardless of height; unless the barrier, because of the location of the barrier or another physical characteristic of the barrier, is likely to pose a significant threat to human life or property if the barrier fails (as determined by the Director).

Formula for Distribution of Assistance Grants (taken from Section 12 of the National Dam Safety Act of 1996)
Amounts made available under this subsection shall be allocated among the States as follows: (i) One-third among States that qualify for assistance under Section 8(f) of the National Dam Safety Act of 1996; (ii) Two-thirds among qualifying States in proportion to: (I) the number of dams in the State that are listed as State-regulated dams on the National Inventory of Dams as compared to (II) the number of dams in all States that are listed as State-regulated dams on the National Inventory of Dams. The amount of funds allocated to a State under this paragraph may not exceed 50 percent of the reasonable cost of implementing the State dam safety program.

Training for Dam Inspectors

NDSP sponsored many technical training seminars put on through the Association of State Dam Safety Officials and FEMA. These are offered in regional locations across the nation to make them more convenient to the trainee. Topics have included the following:

- Concrete Rehabilitation of Dams
- Hydrology Analysis Using HEC-1 and HEC-HMS
- Embankment Dams: Soils Aspects Including Safety of Existing Dams
- Earth Dam Construction
- Filters and Drain Design
- Construction Inspections
- Stability Analysis of Embankment Dams
- Evaluation of Concrete Dam Stability
- Plant & Animal Penetrations of Earthen Dams

States have received $440,265 in continuing education assistance since FY98. This has allowed dam inspectors in the states to attend vital training courses of their choice in areas such as soil mechanics, hydrology and hydraulics, inspection techniques, emergency action planning, earthquake analyses, dam design, dam failure analyses, seepage analyses and others.

Dam Safety Research

Under the NDSP Research Program, new doors have been opened to stronger, safer dams and dam safety programs.

In-depth research data gathering projects proved a useful part of the program. Now, comprehensive reports on state-of-practice in specific technical areas are complete. Detailed lists of research gaps in those same technical areas have been determined and are being disseminated throughout the dam safety community, top research facilities and universities, for future consideration as research projects.

Development of Archives and Libraries Toward a Comprehensive Understanding of Past Experiences

Technical Guidebooks and Pamphlets

Studies Into the Future Funding for Dam Repairs

National Inventory of Dams

The National Inventory of Dams Program is operated by the Corps of Engineers. This federal/state partnership in collecting data on dams is working well, with every state except Alabama contributing data to the national database.

Dam Owner and Public Education

Public awareness of dam safety is a major element of the NDSP. The NDSP is constantly looking for ways to increase the general public's awareness of the importance of maintaining safe dams and the dam owner's knowledge about proper dam maintenance techniques and other activities that will ensure the safety of dams.

One major project now in development through the NDSP is the Dam Owner Education Coordinators Project: The intent is to develop a curriculum and train a team of presenters to go into the states and hold dam owner training sessions. The draft-packaged curriculum, including trainer and participant handbooks, CDs, brochures, etc., will be complete in 2002. The pilot program will begin in January 2002 with three pilot workshops set.

Challenges for the Future

It is essential to place a high priority on mitigating risk associated with all types of disasters, whether natural or manmade. Dams are a critical part of our national infrastructure. They provide benefits upon which our communities and industries depend. However, safety is essential to the efficient operation of the dam and to the people and property surrounding the structure. Safety cannot be realized without adequate regulatory programs at the state and federal levels.

To strengthen the effort, a strong, centralized national program—the National Dam Safety Program—is imperative. Continuation of the National Dam Safety Program would provide the needed tools to assist state dam safety programs, to increase the knowledge base and technical understanding through research and to strengthen the partnership between the federal, state and private sectors.

Based on analyses of the National Dam Safety Program 5-year implementation and the state of dam safety programs in 2002, the following Challenge for the Futures focus attention on future needs in dam safety.

Challenge for the Future: Develop a National Dam Rehabilitation/Repair Loan Program for Dam Owners

Dam owners and state regulators need a funding source to assist with resolving safety issues related to dams. In the five years since the establishment of the National Dam Safety Program, there has been an increasing awareness of characteristics, numbers, importance and safety requirements of dams in the country. With this recognition comes the realization of the deteriorating condition of many of these structures and of the lack of a focused public policy to address the problem.

Of the approximately 78,000 dams in the National Inventory of Dams, private business, citizens, and state and local governments own a large majority. It is difficult for many of these dam owners to find the funding necessary to undertake rehabilitation work when necessary. Often times, vital repairs are neglected, and these dams are subject to further deterioration due to lack of funds and neglect. Deterioration can lead to dam failure. These types of disasters can cause great destruction and loss of life, with no respect for state boundaries.

A few states across the country have established innovative funding programs but there is currently no comprehensive federal funding mechanism to assist dam owners. There is currently only one federal dam rehabilitation funding program, the Small Watershed Rehabilitation Act, which focuses solely on the 10,000 small watershed dams built by the US Department of Agriculture in the mid-twentieth century.

Challenge for the Future: Expand the State Assistance Grants Program

There is a serious need, in almost every state, to pump additional state resources into dam safety programs. It is clear, based on the first five years of the NDSP State Assistance Grant Program, that the additional funds delivered to states through this Program are providing additional personnel and other resources to state programs to help carry out the regulatory program.

Safety regulation is essential to reduce the hazards involved with dams—hazards that cut across states boundaries. The responsibility rests almost entirely with the states. States have responsibility for safety regulation over about 95 percent of the nation's dams.

Support for state regulatory programs is lacking in many states. There are not enough state inspectors on state staffs to carry out needed inspections of dams. Many states are simply under-resourced for carrying out the letter of the law. State budgets for dam safety range from $0 to $6 million. But, the average annual state dam safety budget is about $450,000. The average number of regulated dams per state is approximately 1,500. The average number of dam inspectors per state is 6; this means that each dam inspector is responsible for overseeing the safety of about 250 existing dams, plus the additional responsibilities of overseeing new construction, Emergency Action Plans, overseeing rehabs, owner education, etc.

ASDSO has determined that, in general, eight state regulators are necessary per 200 dams to do the best job possible in carrying out the regulatory mandate set out in most state dam safety laws. (*Model State Dam Safety Program*, Association of State Dam Safety Officials, 1998) This would mean that the average program regulating 1,500 dams would need about 60 professionals as opposed to 6!

Challenge for the Future: Maintain and Improve Upon the Dam Inspector Training Program

Every state has sent at least one dam inspector to continuing education through the NDSP. Many federal leaders have taken advantage of this important program, too. There is no other national program that focuses on training dam safety engineering and safety techniques.

Challenge for the Future: Provide Increased Resources for Owner Education

The majority of dam owners in the US are private citizens or groups. Many are unaware or under-aware of their obligations and liability as dam owners. An important focus of the NDSP should be on training dam owners across the US to better understand all issues involved with dam ownership.

Challenge for the Future: Develop Better Program of National Public Awareness

The public is generally unaware of the benefits dams bring to their community and to the US as a whole. They are similarly unaware of the effect a dam failure could have on them, through flooding and the potential for loss of life or property and the loss of the goods or protection supported by the dam.

Example: many houses are built in dam failure flood inundation zones. Zoning board are unaware of this when they develop zones, developers are unaware of it when they construct within this zone, and home/property owners buy in this zone completely unaware of what the consequences might be should the dam fail.

A national and local focus should be placed on increasing public awareness of dam safety similar to the Flood Insurance Program campaign to increase awareness of the need to purchase flood insurance.

Challenge for the Future: Develop a National Information Technology System for Dam Safety

To manage the risks and benefits associated with dams, a vital part of our nation's infrastructure, it is critical that information resources be available to support the development of informed public policy, the implementation of sound technical standards and solutions to dam safety problems.

An information technology network should be implemented, designed to meet the needs of the dam safety community, dam engineers, policy makers and the public.

Challenge for the Future: Develop a National Program to Increase Security Around Dams

In the wake of the terrorists attacks on the US, it has become very clear that the nation's infrastructure could be vulnerable to compromise. Dams are a major part of the infrastructure.

Development of a national program to identify the nation's most vulnerable dams and to step up security in and around those dams is essential for national security.

Challenge for the Future: Place Future Emphasis on the Need for Recruiting New Dam Safety Engineers

Many in the industry worry that talented young people are decreasingly interested in the engineering fields related to dam safety engineering—civil engineering, agricultural engineering, hydrology/hydraulics, geology—to name a few.

Recruitment of new professionals, coupled with a concerted effort to transfer knowledge from those who are retiring within the field, is essential for a vital knowledge base and technical capability into the future.

Challenge for the Future: Educating Policymakers to the Importance of Dam Safety

It cannot be emphasized enough how important dams are to the nation's economy and to the safety and well-being of citizens. Future federal and state policies concerning everything from public safety, to homeland security, to energy, to flood control should take into consideration the maintenance and rehabilitation of dams. Education of lawmakers at all levels is an important part of the future National Dam Safety Program.

Association of State Dam Safety Officials
State-By-State Statistics on Dams and State Safety Regulation - 2001

State	Total Dams in National Inventory[1]	Total Dams Under State Regulation[2]	High-Hazard Potential State Dams[3]	State-Determined Deficient Dams[4]	State Dam Safety Budget (x thousand)	No. State Staff Dedicated to Dam Safety Regulation	No. State Regulated Dams Per FTE Staff (to nearest whole no.)
Alabama***	1,570**	1,704**	184**	150**	$0	0	>1,704**
Alaska	112	78	16	NR	$84**	1	78
Arizona	315	214	73	23	$500	8	27
Arkansas	927	427	98	25	$264	4.2	102
California	523	1,238	392	0	$6440	68	18
Colorado	1,666	1,833	304	190	$950	14	131
Connecticut	707	3,000	236	11	$472	6	500
Delaware***	73*	98*	9*	NR*	NR*	NR*	NR*
Florida	678	800	72	NR	$5000	32	25
Georgia	4917	3350	385	65	$423	10	335
Hawaii	129	129	56	0	$135	2	65
Idaho	343	431	100	NR	$305	7.5	57
Illinois	1,232	1,278	167	NR	$335	4.5	284
Indiana	1,463	1,200	243	NR	$340	5	240
Iowa	3233	3283	77	NR	$25	0.3	10,943
Kansas	6,077	9,899	200	51	NR	NR	NR
Kentucky	1012	981	208	0	$2017	14	70
Louisiana	381	311	12	0	NR	3.1	100
Maine	617	840	20	65	$46	1	840
Maryland	287	395	57	8	$415	6	66
Massachusetts	1,528	2,921	333	21	$558	6	487
Michigan	869	1153	82	NR	$400	4.5	256
Minnesota	932	852	40	NR	$237	2.7	316
Mississippi	3,328	3,470	262	48	NR	2	1735
Missouri	4,088	625	437**	23	$288	6	104
Montana	3,523	2,865	97	12	$190	5	573
Nebraska	2,078	2,078	99	0	$284	5.2	400
Nevada	323	577	106	8	$115	2	289
New Hampshire	613	3,223	87	0	$535	7	460
New Jersey	824	1,666	188	60+	$590	10	167
New Mexico	533	488	173	6	$486	6	81
New York	1,970	5,740	381	52	$648	6	957
North Carolina	2,851	4,586**	988**	139**	$801	16	287
North Dakota	799	1,521	27	3+	$200	4	380
Ohio	1,766	2,703	502	450	$1200	15	180
Oklahoma	4,523	4,393	145	3	$185	1.8	2441
Oregon	833	3,733	122	0	$255	3.1	1204
Pennsylvania	1,412	2,916	746	28	$1698	22.5	130
Puerto Rico***	36	36	33	2	$466	8	5
Rhode Island	185	510	16	40	$78	1.1	510
South Carolina	2,252	2,293	151	3	NR	5.5	417
South Dakota	2,443	2,303	48	4	NR	2.5	901
Tennessee	1,135	621	151**	20	$275	7	89
Texas	6,838	7,247	818	403	$568	6	1208
Utah	654	1,948	214	41	$458	5	390
Vermont	348	2,000	53**	NR	$222**	2.3**	870
Virginia	1,597	494	105	50	$351	6	82
Washington	653	880	116**	31	$348	6.3	140
West Virginia	537	350	245	40	$335	6	59
Wisconsin	1,291	3,402	192	NR	$486	6.5	523
Wyoming	1,216	1,332	64	3	$104	3.4	392
TOTAL	78,240	100,415	9930	2082	$30,112	377	31,617

1 - Includes dams of any size that are likely to pose a significant threat to human life or property in case of failure, and all other federal and non-federal dams > 25' high that impound > 15 acre-feet; and dams > 6' high that impound > 50 acre-feet.

2 – Estimated number of all dams under state regulatory control

3 - High-Hazard by state definition derived from state inventory in column 2. Individual states' definitions may differ from the federal (National Inventory of Dams) definition. * indicates figure taken from NID and based on NID definition.

4 - Dams with identified deficiencies by state definition (varies state to state) derived from state inventory in column 2

NR = Not Reporting. Some states do not keep data on these categories.

+ High hazard dams only

* Since Alabama has no dam safety staff, the average number of regulated dams per FTE staff is actually larger than this.

***FY2000 data not provided by Alabama, Delaware and Puerto Rico.

**Individual State Notes:

AL: The Alabama legislature has not established a dam safety program. Last state report to NID was in 1979-1980. AK: Significant salary/benefits reduction due to staff change. Grants not included in this figure.

MO: Significantly larger than previous submission, which included only Class 1 dams. Revised number includes both Class 1 and Class 2 dams, which better meets NID standards.

NC: Hurricane Floyd (Sept 1999) and more accurate assessment techniques account for significant changes in data since last report.

TN: Total number of regulated, high hazard dams. There are an additional 62 high hazard “farm ponds” that are not regulated.

VT: There are another 132 Significant Hazard potential dams with loss of life potential. Budget includes new position not yet filled.

WA: According to the federal (NID) standards, there are 310 high hazard potential dams in the state of Washington.