

DAMS



C-

2006 Report Card for Pennsylvania's Infrastructure

Due to the establishment of the Pennsylvania Department of Environmental Protection's Bureau of Dams and Waterways Management in the late 1970s, Pennsylvania has remained ahead of most other states in the area of dam safety. However, about 35% (266) of the state's "high hazard" dams – dams whose failure would cause probable loss of human life and substantial property damage – are considered deficient. The estimated cost to repair all 725 deficient dams statewide over the next five years is more than \$1 billion.

BACKGROUND

Man-made reservoirs provide substantial benefits to the American public, including water supply for drinking, irrigation and industrial uses, flood control, hydroelectric power, recreation and navigation. However, the dams that impound these reservoirs also represent a significant risk to public safety, local and regional economies, and the environment.

Historically, some of the worst disasters in the United States have resulted from dam failures. In 1889, more than 2200 lives were lost when the South Fork Dam failed above Johnstown, Pennsylvania. The 1928 St. Francis Dam failure killed 450 people. During the 1970's, the failures of the Buffalo Creek Dam in West Virginia, Teton Dam in Idaho, and the Toccoa Falls Dam in Georgia resulted in a combined loss of 175 lives and more than \$1 billion in damages.

Several of these dam failures in the early 1970's spurred the federal government into action and led to the enactment of the National Dam Inspection Act of 1972. Following the Teton Dam and Toccoa Falls Dam failures, as well as the Laurel Creek Dam failure in Pennsylvania in 1976/1977, the statute was implemented, and Phase I inspection of all non-federal dams listed in the national inventory began in 1978 under the direction of the U.S. Army Corps of Engineers. An inspection report was prepared for each of the dams and the reports categorized the condition of the dams as either Good (green cover), Fair (yellow cover), Seriously Inadequate Spillway (white cover) or Poor (red cover). The dams were also classified as High, Significant, or Low Hazard depending on the impact that a dam failure would have on downstream residences and infrastructure. The inspections were conducted over a period of about 4 years and the reports were distributed to the owners of the dams and the state agencies regulating dam safety.

Upon completion of this phase of the program, the state dam safety agencies assumed responsibility for the next phase, which involved more detailed investigations of the deficient dams and implementation of the recommended repairs and other upgrades. However, one of the underlying national problems at this time was that many states did not have an established group with regulatory authority for dam safety issues or staff with experience in dam design, construction and maintenance issues.

In Pennsylvania, the Dam Safety and Encroachments Act was enacted in 1978, and the Department of Environmental Resources (predecessor to the Department of Environmental Protection) shortly thereafter established the Bureau of Dams and Waterway Management.

After the National Dam Inspection Program Phase I inspections were completed, the Commonwealth's Dam Safety Program moved forward quickly, requiring from owners more detailed investigations (Phase 2 Studies) and rehabilitation of the state's most deficient high hazard dams. Approximately \$100 million in funding for repairs was made available by low interest loans through PENNVEST and its predecessor, the Water Facilities Loan Board, with an additional \$140 million in upgrades financed through other sources. As a result, Pennsylvania's Dam Safety Program made significant progress earlier than most states. However, the absence of a dam rehabilitation grant or loan program for dams other than those that impounded reservoirs for public water supply limited the pace at which the PADEP Dam Safety Division could address dam safety issues through the 1980's and early 1990's.

The federal government provided some assistance with program improvements through the National Dam Safety Act of 1996. This Act, which was re-authorized as the National Dam Safety and Security Act of 2002, provides funding through grants of up to \$8 million for distribution among the state dam safety programs. However, to date, the funding levels have remained at pre-authorization amounts of only \$5.5 million per year (approximately \$22 million distributed to date) and no federal funding is available for dam owners to make the necessary repairs and upgrades.

Although Pennsylvania has not suffered any major dam failures in recent years, there are constant reminders of the economic devastation that such a failure can cause. In May 2003, the failure of the Silver Lake Dam in Michigan resulted in more than \$100 million in damages, including flooding of 20 homes and three businesses, evacuation of more than 1800 people and layoff of approximately 1,100 mine workers for several weeks due to the flooding of two mines. In March 2004, the Big Bay Lake Dam in Mississippi failed, causing damage or destruction of more than 100 homes, two churches, three businesses and a fire station. Also in 2004, heavy storms in Burlington County, New Jersey resulted in the failure of 18 dams, damage to 28 other dams, evacuation of 1,000 residents, closure of more than 30 roads/highways and nearly \$17 million in total damages. And, just last year, the economic and social impact of the tragedy in New Orleans was exacerbated by the failure of portions of the levee system.

Although the New Orleans disaster will help bring the importance of the safety and integrity of dam and levee-type structures to the public forefront, it may actually delay the national dam safety process by diverting a significant amount of the funding that could have gone to dam safety programs into the investigation and remediation of the New Orleans levee system.

The C- reflects:

- Positive impact of dam safety and inspection programs
- Dam conditions above the national D average
- \$1 billion in need for deficient dams
- Threat a failure would pose to public health, the environment and the economy

CONDITIONS

With its early start on the investigation and rehabilitation of its seriously deficient dams, Pennsylvania has remained ahead of most other states in terms of condition of dams statewide. A large number of the Commonwealth's high hazard dams (those whose failure could result in loss of life and/or substantial property damage) have been upgraded to current dam safety criteria, and regular inspection programs have been in place for some time. Pennsylvania ranks second nationally, behind only California, in terms of annual funding for dam safety (\$2.04 million in 2004) and number of full-time equivalents (24) in the Dam Safety Program. For these reasons, the PADEP had assigned a grade of C- for the condition of its dams when ASCE's national *Report Card* was updated in 2005, as compared to the grade of D assigned for dams nationwide.

Despite this relative success, the grade was only a C-, because PADEP recognizes that there is still a great deal of work that must be done. Of Pennsylvania's 3,089 total identified dams, approximately 725 are still considered deficient in some respect. This includes 266 deficient dams, or about 35%, of the 768 dams that are classified as high hazard and another 43 significant hazard dams.

At an estimated average repair cost of \$1.3 million per dam, the total current cost for upgrading the deficient and high hazard Pennsylvania dams would be about \$400 million. In addition, many of the dams that were upgraded in the early to mid-1980's may soon reach a point where additional upgrades and/or repairs are necessary. PADEP projects that the number of deficient significant and high hazard dams will increase to about 543 by 2010 if needed upgrades are not completed, with an associated repair cost of more than \$700 million over the next 5 years.

POLICY OPTIONS

The main issue preventing the PADEP Dam Safety Division from achieving its goals and many dam owners from improving their dams is a lack of funding for dam rehabilitation projects. The Association of State Dam Safety Officials (ASDSO) estimates that \$36.2 billion is needed to rehabilitate dams across the nation, based on the current national inventory of non-federally owned dams. This statistic highlights the need for a national dam rehabilitation program, a goal that is the driving force behind the formation of the Dam Safety Coalition.

This coalition is comprised of a number of national agencies, including the American Society of Civil Engineers, ASDSO, the National Society of Professional Engineers, the National Watershed Coalition and the U.S. Society on Dams. The Dam Safety Coalition supports the creation of a federal funding program to repair the nation's unsafe dams, addressing the critical issue of deteriorating dam structures that pose a severe threat to many communities throughout the country. The coalition has been a strong supporter of the Dam Repair and Rehabilitation Act, which was introduced in the 108th Congress by Representative Sue Kelly and would provide \$350 million over 4 years for the repair, rehabilitation or removal of non-federal, high hazard, publicly owned dams. Although the bill was not passed in 2005, the recent failure of the Kaloko Reservoir Dam in Hawaii spurred Hawaiian Senators Daniel Akaka and Daniel Inouye to re-introduce the bill in mid-March as the Dam Repair and Rehabilitation Act of 2006, and Congress followed suit by introducing legislation to re-authorize the National Dam Safety Program.

In addition to federal funding, the Council for Safe Dams (a committee of the Northeast Region of ASDSO) has been pursuing a funding program for Pennsylvania dam owners to rehabilitate their dams. Several other states, including New Jersey and New York, have such programs, which increase the number of owners that are financially capable of undertaking these rehabilitation projects. Separate bills that would provide funding for dam safety were introduced in the State House of Representatives and the State Senate in 2005, but neither of these bills has progressed to the point of creating optimism for the dam safety community.

RECOMMENDATIONS

As a member of the Dam Safety Coalition, ASCE recommends that the following measures be taken to promote dam safety within Pennsylvania:

- Passage of state legislation to provide funding for rehabilitation of Pennsylvania dams, which will be needed for leverage of any federal funding programs that may be enacted
- Introduction and passage of federal legislation to create a loan fund for the repair, rehabilitation and maintenance of non-federal dams (Dam Repair and Rehabilitation Act of 2006)
- Re-authorization of the National Dam Safety Program Act

SOURCES

American Society of Civil Engineers, *Report Card for America's Infrastructure*, 2005

Association of State Dam Safety Officials, Annual Report, 2004-2005

Northeast Region Council for Safe Dams, Funding for Dam Rehabilitation – Pennsylvania Dams “Needs Statement”

Pennsylvania Department of Environmental Protection (PADEP), Dam Safety and Encroachments Act, 1978

PADEP, The Inspection, Maintenance and Operation of Dams in Pennsylvania, 1999