

## 2009 Ohio Infrastructure Report Card Dams Fact Sheet Grade: C

*There are more than 2,600 dams in the State of Ohio. The Ohio Department of Natural Resources, Division of Water, Dam Safety Section is responsible for inspection of Ohio's dams. Of the Ohio Dam Safety regulated dams, 33% are deficient. Nearly 70% of Ohio dams are privately owned. The 2007 Dam Safety Section budget was \$1,353,000, an average of \$847 per regulated dam, which ranked 26th in funding out of the 50 States. Dam Safety Section staffing has been reduced by 15% since 2007 due to budgetary constraints. Staff work load has increased to approximately 150 dams per full time equivalent (FTE) staff member. By comparison, the national average in 2007 was 202 dams per FTE staff member. It is estimated that the repair cost for Ohio's deficient dams is nearly \$300 million.*



Figure 1. Columbus Dispatch, June 29, 2008

### Background

Dams provide tremendous benefits, including water supply for drinking, irrigation, and industrial uses, flood control, hydroelectric power, recreation, and navigation. However, dams also represent one of the greatest risks to public safety, local and regional economies, and the environment. Historically, some of the largest disasters in the United States have resulted from dam failures. One early and well-known disaster was the failure of the South Fork Dam above Johnstown, Pennsylvania in 1889, which killed more than 2,200 people. In the next 110 years,

284 dams failed and 1,340 lives were lost. Since 2000, more than 45 dam failures have been documented throughout the U.S., including the Kaloko Dam in Kauai, Hawaii, which killed seven people.<sup>1</sup> These are recent reminders of the potential consequences of unsafe dams.

Dams in Ohio, with the exception of federally owned dams, are subject to regulations administered through the Ohio Dam Safety Program in the Ohio Department of Natural Resources (ODNR), Division of Water. The approximate ownership breakdown of dams in Ohio is 2% federal government, 7% state government, 23% local government, and 68% private (individuals, groups, companies, etc.).<sup>2</sup> There were 1,597 state-regulated dams in Ohio in 2007. Of that total, 375 are classified as High Hazard Class I dams whose failure would result in probable loss of human life or collapse of at least one residence or commercial/industrial building, 543 are classified as Significant Hazard Class II dams whose failure would disrupt a public water supply or wastewater treatment facility, or damage major roads or the only access to critical facilities such as hospitals, and 679 are classified as Low Hazard Class III dams whose failure effects would be limited to rural buildings or local roads. There are nearly 1,000 additional Class IV dams included in the ODNR inventory of Ohio dams that are exempt from the regulatory requirements affecting Class I, II, and III dams because their failure would only result in property damage to rural lands and the dam itself.

An unknown number of dams for coal mining ponds are regulated by the Ohio Department of Natural Resources, Division of Mineral Resources Management (DMRM). At the time of this report it could not be determined how many dams are permitted or their hazard class. Based on information from the DMRM,<sup>3</sup> it is understood that most of these dams are small (less than 20 feet in height) and are usually decommissioned (usually removed) after the mining permit has expired. Of those dams that have not been removed, jurisdiction is transferred to the Dam Safety Section.

## **Ohio Dams Facts and Issues**

Like all man-made structures, dams deteriorate. Deferred maintenance accelerates deterioration and causes dams to be more susceptible to failure. As with other critical infrastructure, a significant investment is essential to maintain the benefits and assure the safety that society requires. To provide safe, continuing service, dams also require ongoing monitoring, frequent safety inspections, and rehabilitation. Aging dams often require major rehabilitation to assure their safety. Downstream development in areas below dams is increasing dramatically. New findings from scientific research of dam failure mechanisms, such as major flood events or earthquakes, frequently demand repairs to dams constructed decades before such scientific research was first conceptualized.

One-third (524 dams) of the state-regulated dams in Ohio have some deficiencies, based on 2007 data tabulated by the Association of State Dam Safety Officials (ASDSO) for all state dam safety programs.<sup>4</sup> This is significantly greater than the national average of 5%, ranking in the top quartile as shown by the thumbnail bar graph in Figure 2.

In 2008, ODNR prepared a Condition Rating for all their High Hazard Class I dams, as requested by the US Army Corps of Engineers for the National Inventory of Dams (NID).<sup>5</sup> The Condition Ratings provide a quantitative basis for assigning an overall grade to dams in this report. Approximately 8% of the Class I dams were not given a rating, typically because they had not been inspected recently. Of the 342 dams that were rated, 1% was considered Unsatisfactory, 33% Poor, 26% Fair, and 40% Satisfactory. For this report card, dams that were

rated Unsatisfactory and Poor were considered to represent those with deficiencies (34%), which compares very well with the 2007 statistics that had near uniform deficiency percentages for Class I, II, and III dams (31%, 33% and 33%, respectively).<sup>4</sup>

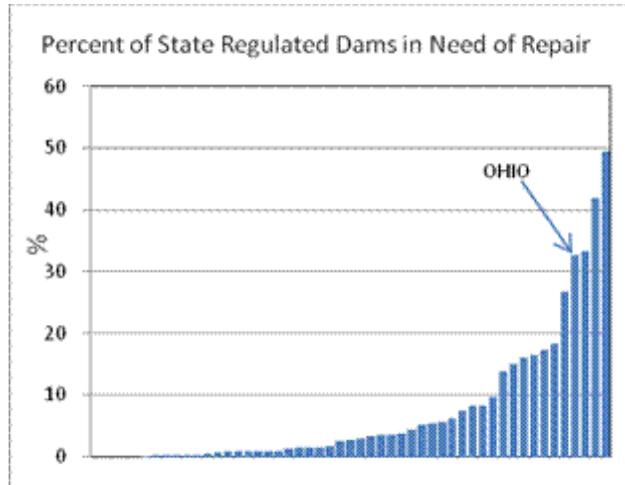


Figure 2.

To compute an overall grade for dams in Ohio, a common four-point scale was used as follows: Unsatisfactory rating = F = 0.0 points, Poor rating = D = 1.0, Fair rating = C = 2.0, and Satisfactory rating = B = 3.0. While there are certainly some dams in Ohio that are in full compliance with all the ODNR requirements, there were no provisions in the NID Condition Rating Guidance for a rating that could be considered an A. The resulting composite score for the condition of state regulated dams in Ohio is a grade point average of 2.05, or a C.

No detailed estimate of the cost to rectify the deficiencies at all 524 state-regulated dams rated as deficient is available. There was a general estimate made in 2008, using 2004 data, of almost \$88 million for repairs to 240 high hazard public dams in Ohio.<sup>2</sup> Using the U.S. Army Corps of Engineer's cost indices,<sup>6</sup> trending that cost to 2009 and prorating it to all 524 dams gives an approximate estimate of \$236 million. Another approximation of \$309 million for the 524 deficient dams was made this year by using some of the general methodologies established in ASDSO's October 2003 report *The Cost of Rehabilitating our Nations Dams*.<sup>7</sup> It is estimated that some 22% of that amount, or \$68 million, is necessary just for rehabilitation of the 117 deficient Class I dams.

There are very few funding assistance programs specifically for dams in Ohio. Dams owned by state and local government bodies may need specific funding for repairs or rehabilitation from the Legislature as has sometimes occurred in the past. Similarly, privately owned dams may have to rely on below-market loans through the Ohio Water Development Authority's Dam Safety Linked Deposit Program. New funding initiatives are needed.

Ohio inspected 40% of its High Hazard Class I dams in 2007, in a focused effort to inspect the largest, most important dams. Similar focus on those dams has resulted in 43% of them now having Emergency Action Plans, a key measure in reducing the risk to the public. According to ASDSO<sup>4</sup>, the percentage of deficient regulated dams decreased from 49% in 2006 to 33% in

2007. Similarly the percentage of deficient high hazard dams decreased from 38% in 2006 to 31% in 2007.

## **Policy Options**

Sufficient funding is needed to continue monitoring the condition of state-regulated dams to assure dam safety. Given Dam Safety Section budget decreases since 2007 and the current economic conditions in Ohio, it is doubtful that any state budget increase will be made in the near future. In January 2009, the Federal Emergency Management Agency did budget \$10 million for the National Dam Safety Program, the source of federal funding assistance to state dam safety programs. This action also represents a decrease in funding for the ODNR Dam Safety Section, as it is not the full authorized level of \$11.7 million for FY09.

Federal funding is also needed for the rehabilitation of dams, especially high hazard dams. The Dam Repair and Rehabilitation Act of 2009 was introduced in both the House and Senate on March 26, 2009. This bill would establish a program through the Federal Emergency Management Agency (FEMA) to provide grant assistance for the rehabilitation and repair of deficient state and locally owned high hazard dams. It would provide up to \$200 million over five years to address deficiencies at the nation's publically-owned, non-federal dams. Grant funds would be distributed through state dam safety agencies based on the number of high hazard publically-owned, non-federal dams in the state. This process should presumably benefit Ohio, which has 3.2 times the national average of deficient high hazard dams. This bill is endorsed by ASCE and ASDSO.

Unlike highways and other infrastructure, the general public doesn't directly "use" a dam. Rather, the public uses the drinking water or recreational lake and shoreline made possible by a dam, or benefits from the flood protection or low cost energy provided by a dam. In many cases, the beneficiary of a dam may not even be aware of the presence of a dam or its complexity. As a result of the low public awareness of dams, the demand or "outcry" for dam rehabilitation is often limited until failure of such a facility puts the disaster into the headlines.

The result of dam inspections made by the Dam Safety Section is a written report, which contains a section entitled "required" repairs. If deficiencies are serious enough, the state has the power to enforce repairs. Ohio Revised Code 1521.062 provides enforcement authority against any deficiency, but does not stipulate how serious the deficiency has to be. The threat of enforcement/fines appears to be the most likely mechanism that results in the owner making necessary repairs to a dam.

## **Specific ASCE Ohio Council Recommendations**

Since 1998, ASCE has issued report cards on the condition of America's infrastructure, and America's dams have consistently received a grade of D. The *2009 Report Card for America's Infrastructure* noted that nationally the number of deficient dams has risen to more than 4,000, including 1,819 high hazard dams, and that over the past six years, for every deficient high hazard dam repaired, nearly two more have been declared deficient.<sup>8</sup>

The *2009 Report Card for America's Infrastructure* identified five "Key Solutions" to help the country achieve higher grades. While directed at the nation's infrastructure as a whole, the "Key Solutions" are also applicable to dams, and may be summarized as follows:

- Increase Federal Leadership in Infrastructure – There needs to be a renewed involvement at the federal level with our critical infrastructure including dams. We need a national vision and strong federal leadership to be shared at all levels of government and private owners.
- Promote Sustainability and Resilience – America’s infrastructure must be able to meet the current and future needs of the nation while protecting and improving the environment. Both structural and non-structural methods need to be used to promote sustainability. Research and development should be funded at the federal level to develop new materials and more efficient methods for the construction and rehabilitation of the nation’s infrastructure.
- Develop Federal, Regional, and State Infrastructure Plans – Well conceived plans are needed to prioritize infrastructure investment to focus funding to solve the most pressing problems
- Address Life-Cycle Costs and Ongoing Maintenance – Owners of infrastructure should perform life-cycle cost analysis, on-going maintenance, and planned renewal to provide more sustainable and resilient infrastructure.
- Increase and Improve Infrastructure Investment from All Stakeholders – There must be a renewed commitment to infrastructure investment by all levels of government, owners, and users of infrastructure. Significant funds will need to be invested to provide sustainable development and ongoing maintenance, and all available funding options need to be explored and debated.

Ohio can support ASCE’s “Key Solutions” by a variety of programs currently in place. This support should include:

- Continuing to offer low interest loans for dam repair through the Ohio Water Development Authority. In keeping with the American Recovery and Reinvestment Act of 2009, offer zero percent loans for dam rehabilitation.
- Promoting and supporting federal legislation to provide grants to Ohio’s Dam Safety programs. These grants are particularly needed to offset reduced state budgets.
- Supporting passage of the Dam Rehabilitation and Repair Act of 2009 to provide federal funds to correct deficiencies at non-federal publicly owned dams.
- Continuing to enforce the implementation of repairs to severely deficient dams. Strengthen state rules to provide greater enforcement of “required” repairs.

## Sources

<sup>1</sup> Association of State Dam Safety Officials (ASDSO), *State and Federal Oversight of Dam Safety Must Be Improved*, news media document, November 2008

<sup>2</sup> ASDSO, *Dam Safety in Ohio*, fact sheet, 2008

<sup>3</sup> Ohio Department of Natural Resources (ODNR), Division of Mineral Resources Management, telephone discussion, March 19, 2009

<sup>5</sup> ODNR, *2008 Jurisdictional Dams by Classification with Class I Condition Ratings*

<sup>6</sup> U.S. Army Corps of Engineers, *EM 1110-2-1304 Civil Works Construction Cost Index System Tables*, revised March 31, 2008

<sup>7</sup> ASDSO, *The Cost of Rehabilitating our Nations Dams*, October 2003

<sup>8</sup> American Society of Civil Engineers (ASCE), *2009 Report Card for America's Infrastructure*, January, 2009

The following additional sources provided additional information for this section of the Dams section in this report card:

<sup>9</sup> ASDSO, *Investment in Infrastructure: Focus on Dams*, press release, January 29, 2009

<sup>10</sup> ASCE, *2005 Report Card for America's Infrastructure*, 2005

<sup>11</sup> ASCE Akron-Canton Section, *2005 Infrastructure Report (Portage, Stark, and Summit County Governmental Entities)*, 2005

<sup>12</sup> ASCE, *Failing Infrastructure Cannot Support a Healthy Economy*, news release, January 28, 2009