



The National Dam Safety Program: 25 Years of Excellence



FEMA

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Safety

Cover Photo:

Theodore Roosevelt Dam, Arizona
Department of the Interior, Bureau of Reclamation



The Bureau of Reclamation recently completed modifications to the Horsetooth Reservoir Dams in north-central Colorado. The project, originally estimated to take up to 5 years at a total cost of \$105 million, was completed in half the time and for about half of the estimated costs.

The National Dam Safety Program: 25 Years of Excellence

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“If there is magic on the planet, it is contained in water.”

Loran Eisely

The Immense Journey, 1957

Water is one of the most powerful natural forces to shape the American landscape and one of our most precious resources. To ensure continued benefits from our rivers, dams and other water control structures have been built to manage water and keep rivers in their channels, rather than let them wander at the whim of nature. Without dams and other water control structures, the rivers we rely on can change course during times of flood, with severe economic and social consequences.

Today, dams are a critical and vital part of the American infrastructure. They provide a range of benefits, including hydroelectric power, river navigation, water supply, wildlife habitat, waste management, flood control, and recreation. Although the Federal Government owns or regulates only about 5 percent of the dams in the United States, many of these dams are significant in terms of size, function, benefit to the public, and their hazard potential.



Over the past 25 years, the National Park Service has completed 30 dam modification projects and deactivated over 100 dams. Cascade Dam in the Yosemite National Park, California, was recently removed by the National Park Service.

The Federal Agencies and Dam Safety

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“When the well is dry, we know the worth of water.”

Benjamin Franklin

Poor Richard's Almanac, 1746

This year marks 25 years of leadership of the National Dam Safety Program by the Federal Emergency Management Agency, now the Department of Homeland Security's Federal Emergency Management Agency. Under FEMA's leadership, the National Dam Safety Program is dedicated to protecting the lives of American citizens and their property from the risks associated with the development, operation, and maintenance of America's dams.

In June 1979, the *ad hoc* interagency committee on dam safety issued the first guidelines for federal agency dam owners. The *Federal Guidelines for Dam Safety* have withstood the test of time. Since their publication, all of the federal agencies responsible for dams have implemented their provisions and all of the federal agencies have done an exemplary job in ensuring the safety of dams within their jurisdiction. They have accomplished this by sharing resources whenever and wherever possible to achieve results and realize improvements in dam safety. Many of the federal agencies

also maintain very comprehensive research and development programs and training programs. The federal agencies are now incorporating security considerations into these programs to protect their dams and the American population against all types of threats.

“Throughout history, in all parts of the world, dams built to store water have

occasionally failed and discharged the stored waters to inflict sometimes incalculable damage in the loss of lives and great damage to property...These guidelines are intended to make as small as possible the failure risk inherent in constructing new dams, and to prioritize needs to improve existing dams according to hazard potential.”

Federal Guidelines for Dam Safety
June 1979, FEMA 94/Reprinted April 2004

The Benefits of Dams

“Dams are one of a series of infrastructure projects aimed at the economic development of a region, nation, or river basin. The direct benefits they provide to people are typically reduced to monetary figures for economic analysis and are not often recorded in human terms. In addition, simply accounting for these direct benefits often fails to capture the full societal benefits associated with providing water, electricity, flood control, and including any indirect economic benefits or multiplier effects.”

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Dams and Development: A New Framework for Decision-Making
The Report of the World Commission on Dams, November 16, 2000

Irrigation

Ten percent of American cropland is irrigated using water stored behind dams and thousands of jobs are tied to producing crops grown with irrigated water. The Bureau of Reclamation is the largest wholesaler of water in the United States. The Bureau of Reclamation brings water to more than 31 million people and provides one out of five Western farmers with irrigation for 10 million acres of

farmland that produce 60 percent of the Nation’s vegetables and 25 percent of its fruits and nuts.

Electrical generation

The United States is one of the largest producers of hydropower in the world, second only to Canada. Dams in the United States produce over 103,800 megawatts of renewable electricity and meet 8 to 12 percent of the Nation’s power needs, or enough electricity to

supply the nearly 35 million residential customers in California, New York, Ohio, Pennsylvania, and Texas.

Flood control

Dams are a critical feature of the Nation's ability to reduce the effects of flooding along river courses. Under the Flood Control Act of 1944 and the Watershed Protection and Flood Control Act of 1954, the Natural Resources Conservation Service has assisted watershed project sponsors in the construction of 11,000 flood control dams in 2,000 watersheds in 47 states. These projects provide an estimated \$1.7 billion in annual benefits in reduced flooding and

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As proof of the integrity of dams operated and maintained by the Tennessee Valley Authority, a major flood in May 2003 on the Tennessee River caused no damage to any Tennessee Valley Authority dams. The Tennessee Valley Authority operates and maintains 49 dams, including the Norris Dam. The Norris Dam was the first in a series of dams built by the Tennessee Valley Authority beginning in 1933.

erosion damage, recreation, water supplies, and wildlife habitat. Besides producing electricity, the Tennessee Valley Authority system of dams prevents an average of about \$280 million in flood damage each year.

Renewable, clean energy

As a renewable source of electricity, hydropower is considered clean because it does not contribute to global warming, air pollution, acid rain, or ozone depletion. In 1999, hydropower avoided the release of an additional 77 million metric tons of carbon equivalent into the atmosphere. Without hydropower, the United States would have to burn an additional 121 million tons of coal, plus 27 million barrels of oil, and 741 billion cubic feet of natural gas combined. The Federal Energy Regulatory Commission, the licensee of about 2,000 hydroelectric projects in the United States, is now strengthening the Saluda Hydroelectric Project in South Carolina so that it can protect thousands of people from an earthquake the size of the 1886 Charleston earthquake.

Water storage

Dams create reservoirs that supply water for a multitude of uses, including industrial, municipal, and agricultural. The U.S. Section of the International Boundary and



The U.S. Section of the International Boundary and Water Commission has jurisdiction of the Amistad Dam and Reservoir, which was constructed by Mexico and the United States in the 1960's.

Water Commission has jurisdiction of two large international storage dams and four small diversion dams on the Rio Grande and Colorado Rivers. The Falcon Dam and Reservoir was the first of the international multi-purpose storage dams to be constructed on the Rio Grande. Built in the 1950's, Falcon Dam has a maximum capacity of almost 4 million acre-feet. The Amistad Dam and Reservoir, which was constructed by the United States and Mexico in the 1960's, sits 254 feet above the riverbed and its reservoir has a maximum capacity of 5.29 million acre-feet. Both Falcon and Amistad provide important water conservation, flood control, recreation, and electrical power generation that benefit both U.S. and Mexican border residents.

“Black Start” capabilities

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There are 4,316 megawatts of “incremental” hydropower available at sites with existing hydroelectric facilities. During the August 2003 blackout in the Northeast, which affected an estimated 50 million people from New York City to Michigan, hydropower projects in upstate New York and several other states continued to run, leading the way to restoring power to millions of Americans. Two projects licensed by the Federal Energy Regulatory Commission, the Niagara and St. Lawrence-FDR, operated continuously during the blackout.

Sediment/hazardous materials control

Dams on the Susquehanna River in Pennsylvania have been instrumental in preventing large-scale pollution of the Chesapeake Bay from sediment. The Susquehanna River Basin encompasses about 64,000 square miles, and the River contributes about 50 percent of the fresh water supply to the Bay. The River also carries 3.1 million tons of sediment each year. Since 1928, over 70 percent of those sediments have been retained by the Holtwood, Safe Harbor, and Conowingo Dams. Thus, the states bordering the Bay have time to develop better sediment controls to protect the valuable resources of the Bay.

Navigation

Dams, locks, and levees provide for a stable system of inland river transportation throughout the heartland of the Nation. The United States Army Corps of Engineers navigation projects in the United States serve 41 states, maintain 12,000 miles of channels, carry 15 percent of U.S. freight carried by inland waterways, operate 275 locks, and maintain 926 harbors. Nearly 2,600 companies operate vessels on waterways, with nearly 2.4 billion tons of goods (945 million

inbound foreign, 399 million outbound foreign, 1,042 million domestic). The overall value of foreign commerce handled at ports in 2000 was \$756.9 billion.

Fisheries

Dams can enhance wetlands and support healthy fisheries. Wildlife preserves can be created around reservoirs, which in some cases provide stable habitats for endangered or threatened species. Since 1999, the Fish Passage Program of the U.S. Fish and Wildlife Service has restored access to over 3,443 miles of river habitat and 65,088 acres of wetlands for fish spawning and growth.

Recreation

Dams provide prime recreational facilities throughout the country. There were a total of 81 million recreation user days provided at Federal Energy Regulatory Commission-licensed hydropower projects alone in 1996. Created by Congress in 1916, the National Park Service, which is part of the Department of Interior, manages over 500 stream-flow control structures that are within or adjacent to park boundaries. Ten percent of the American population visits at least one United States Army Corps of Engineers facility each year. Boating, skiing, camping, picnic areas, and boat

launch facilities are all supported by dams.

Mining

There are more than 1,300 mine tailings impoundments in the United States that allow the mining

of the Nation's coal and other vital minerals while protecting the environment. These impoundments are privately owned and their safe design, operation, and maintenance are regulated by the Department of Labor, Mine Safety and Health Administration.

The Interagency Committee on Dam Safety

"FEMA's role in national dam safety is unique. Although it neither owns dams nor has regulatory responsibility for dams, FEMA is responsible for coordinating all of the activities of the National Dam Safety Program."

Dam Safety and Security in the United States: A Progress Report on the National Dam Safety Program in Fiscal Years 2002 and 2003
FEMA 466/April 2004

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The Interagency Committee on Dam Safety (ICODS) was established in 1980 and has met on a quarterly basis since that time. ICODS encourages the establishment and maintenance of effective federal programs, policies, and guidelines to enhance dam safety and security, and serves as the permanent forum for the coordination of federal activities in dam safety and security. ICODS, which is chaired by FEMA, is composed

of representatives from all the federal agencies that build, own, operate, or regulate dams.

Albeni Falls Dam, Idaho
U.S. Army Corps of Engineers



- Department of Agriculture
 - Agricultural Research Service
 - Farm Service Agency
 - U.S. Forest Service
 - Natural Resources
 - Conservation Service
 - Rural Housing Service
 - Rural Utilities Service
- Department of Defense
 - Department of the Air Force
 - Department of the Army
 - Department of the Navy
 - U.S. Army Corps of Engineers
- Department of Energy
- Department of the Interior
 - Bureau of Indian Affairs
 - Bureau of Land Management
 - Bureau of Reclamation
 - U.S. Fish and Wildlife Service
 - National Park Service
 - Office of Surface Mining
 - U.S. Geological Survey
- Department of Labor, Mine Safety and Health Administration
- Department of State, International Boundary and Water Commission (U.S. Section)
- Federal Energy Regulatory Commission
- Nuclear Regulatory Commission
- Tennessee Valley Authority

For more information on the National Dam Safety Program, see www.fema.gov/hazards/damsafety

