



2013 Annual Year-in-Review

National Dam Safety Program
Year-in-Review 2013

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FEMA

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National Dam Safety Program Year-in-Review 2013: Setting the Stage

The National Dam Safety Program (NDSP) is a national program that targets the improvement of dams and the safety of those who live in surrounding communities.

Since the National Dam Safety Program was first authorized by Congress in 1996, there have been marked improvements in the safety of many of our Nation's dams. This is directly attributable to what the Program has been able to achieve since its inception.

This *Year-in-Review* provides the National Dam Safety Program's (NDSP) progress in 2013 along with important accomplishments that continue across all Program elements, including State assistance, research, training, and the alignment of the Program within the emergency management and resilience frameworks. Beginning in 2012, the Federal Emergency Management Agency (FEMA) began to highlight key Program accomplishments on a yearly basis to advance awareness and understanding of the important role the Program plays to reduce risk, promote benefits, and enhance safety surrounding our Nation's dams.

National Dam Safety Program Highlights

During 2013, many important accomplishments were achieved, and a few are highlighted below:

- On May 31, 2013, FEMA participated in National Dam Safety Awareness Day (NDSAD). FEMA coordinated with numerous key stakeholders, associations, and other Federal agencies to pilot a more concise NDSAD messaging campaign throughout the United States. To ensure consistent message delivery, the Planning Team prepared a number of template materials (e.g., press release, talking points, suggested web content, event planning checklist, invitation letter, and NDSAD ideas for kids) that pilot communities could tailor and use for their own one-day events.



Garrison Dam on Lake Sakakawea

- In July of 2013, FEMA released the *Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures (FEMA P-946)*. The Guidelines provide dam safety professionals with guidance on how to arrange dam breach inundation modeling studies and conduct mapping that can be used for a variety of aims—including dam safety, hazard mitigation, consequence evaluation, and emergency management including the development of Emergency Action Plans (EAP). This guidance provides a consistent approach that can be applied across the country.

The National Dam Safety Program Mission and Vision: Collaboration Is Key

In October 2012, FEMA and its partners, the National Dam Safety Review Board (NDSRB) and the Interagency Committee on Dam Safety (ICODS), presented the *Strategic Plan for the National Dam Safety Program for Fiscal Years 2013–2016*. This strategic plan provides a clear framework to accomplish the mission and vision of the NDSP over the course of the next four years.

National Dam Safety Program Vision:

The benefits and risks of dams are understood, and risks are managed to improve public safety, economic strength, national security, and to sustain the environment.

National Dam Safety Program Mission:

Reduce risks to life, property, and the environment from dam failure by guiding public policy and leveraging industry best practices across the dam safety community.

A Look Back on 2013

The year 2013 had a profound impact on the development of the NDSP. Initiatives that were first outlined in *A Progress Report on the National Dam Safety Program Fiscal Years 2008 through 2011* informed the direction of the work done during the year. The numerous strategies identified in the report were maintained to realize the vision and mission for the Program and to reduce the risk to the American public from dam failure. Work initiated during the period by continued to develop upon a number of key initiatives that help define the NDSP. These include:

- Promote community and regional resilience.
- Increase awareness of dams by the downstream public.
- Increase the number and updates of EAPs.
- Assess the risk associated with dams.
- Increase inspections of dams.
- Increase the number of stakeholders trained about dam safety.
- Translate research products into training and expand the research program.
- Achieve the participation of all states in the Program.

COLLABORATION:

Key to Program Success

The collective membership of the NDSRB and ICODS includes representatives from the following agencies and groups:

- FEMA
- Department of Energy
- Department of the Interior
- The Federal Energy Regulatory Commission
- International Boundary and Water Commission
- Nuclear Regulatory Commission
- Tennessee Valley Authority
- U.S. Department of Defense
- U.S. Department of Agriculture
- Department of Labor
- States
- Private Sector

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The accomplishments of NDSP members are key to successfully implementing these strategies and safeguarding communities across the United States. Every level of government is intrinsically tied into the Program. Local, state, and federal government officials, in conjunction with stakeholders, continue to pool resources in order to achieve the Program's mission. The Bureau of Indian Affairs (BIA) parallels these efforts in accordance with the Indian Dam Safety Act of 1994 (Public Law 103-302), the BIA is responsible for all dams on tribal lands. There are 910 dams on Indian reservations, 136 of which are classified as high- and significant-hazard potential dams. The BIA Safety of Dams Program works with Indian tribes to maintain these dams and reduce the potential loss of human life and property damage due to catastrophic dam failure by making BIA dams as safe as practically possible.

For more information on the BIA Safety of Dams Program visit www.bia.gov.

State Success Stories

Our nation perseveres as a collaboration of states. Along that same thread, the NDSP persists and prospers on continuous collaboration and exchange between the federal and state entities. While FEMA sets the national agenda, states work on implementing standards of excellence for their dam safety programs.

The Association of State Dam Safety Officials (ASDSO) put out a statement echoing this partnership:

Everyone has a role to play in creating a future where all dams are safer, including dam owners, engineers, community planners/leaders, and Federal and State regulators: it's a shared responsibility. Across the country, State dam safety programs inspect existing dams, oversee remediation of deficient dams, and work with local officials and dam owners on emergency preparedness and mitigation of downstream risk to development. Knowledgeable and dedicated officials lead these programs, yet they are facing major challenges because of inadequate budgets, staffing, and in some cases, inadequate authority to ensure public safety. The NDSP and State Assistance Grants play a valuable role in helping State dam safety programs fulfill this important mission.

States can point to a number of statistics that showcase the success of the Program and its initiatives:

Increased Number of Emergency Action Plans for High-Hazard Potential Dams

Dams assigned the high-hazard potential classification are those where failure or mis-operation will probably cause loss of human life.

- Nationally, the percentage of high-hazard potential dams with an Emergency Action Plan (EAP) increased from 35 percent to 70 percent between 1999 and 2013 (*ASDSO Annual Report 2013-2014*).
- From 1999 to 2013, nearly every state has shown marked improvement in the number of EAPs for high-hazard potential dams, with no states showing a significant decrease (*ASDSO Annual Report 2013-2014*).
- In 2013, it was reported that 34 states had “High” EAP Performances for their high-hazard potential dams. This is an increase from the 32 states that reported similar percentages the previous year (*2014 State Dam Safety Program Performance Information Summary, for the 2013 Reporting Year*).

Condition of Dams Reporting Improves the National Understanding of Where Rehabilitation is Most Needed

- Nine states have reported the condition of 100 percent of their high-hazard potential dams to the U.S. Army Corps of Engineers’ National Inventory of Dams (NID), while an additional 30 states have reported the condition of 75 percent or more. The NID is a congressionally authorized database that collects information on 87,000 dams that are more than 25 feet high, hold more than 50 acre-feet of water, or are considered a significant hazard if they fail. The NID is maintained and published by USACE, in cooperation with ASDSO, the states and territories, and federal dam-regulating agencies.
- From 2011 to 2013, there was a substantial increase in the number of states reporting Condition Assessment Performance Ratings in the NID for over 75 percent of their state-regulated high hazard potential dams. In 2011, 24 states were at 75 percent or higher on condition assessment reporting while eight states had from 50 percent to 75 percent reported; the remaining states were below 50 percent. In 2013, the states reporting between 75 percent and 100 percent increased to 37 with no states between 50 percent and 75 percent. Although the NID collection process for condition assessment information began in 2009, states took time to incorporate the necessary changes to their inspection and reporting procedures.

State Assistance Grants: Success Stories

The following describe several State successes with their NDSP State Assistance Grants:

Many states use NDSP State Assistance Grants for the following:

- Train state personnel on dam safety.
- Increase in the number of dam inspections.
- Increase in the submittal and testing of Emergency Action Plans.
- More timely review and issuance of permits.
- Improved coordination with state emergency preparedness officials.
- Identify the dams requiring repair or removal.
- Conduct dam safety awareness workshops and creation of dam safety videos and other outreach materials.

Michigan. Michigan used the state assistance grants to hire, train, and equip an adequate staff of dam safety engineers to administer the program. This includes using the grants to fund a portion of the Dam Safety Program Manager position. Their focus on staff has been instrumental in significantly decreasing the rate of dam failures in the state. Michigan has made it a mission to scan paper copies of engineering plans and storing them digitally. They have also participated in a seminar on how to properly implement EAPs. Much of Michigan's compliance activities targeted meeting compliance standards for both state inspection and EAP requirements and, as a result, their target has been met. Michigan has compliance rates of almost 100 percent for EAP standards and 90 percent for state inspection of high and significant hazard potentials.

Oregon. Over the past number of years, Oregon has used their grants in a number of ways that has strengthened dams state-wide while also educating the public on the subject. They have shored up their personnel by hiring college students on a temporary basis to assist with dam safety project files, national dam inventory, and initial review of new reservoir applications. This is while also setting per diem reimbursement rates for dam safety personnel to attend workshops and training sessions (including the Bureau of Reclamation Dam Operator Training and Maintenance Workshop). Oregon has equipped their staff to succeed in the field. To facilitate work in the field, they purchased a remote control crawler with pan and tilt camera, a video monitor, and 600 feet of cable for viewing conduits and outlet works inside dams that are inaccessible to visual inspection or otherwise unsafe for human access.

During the same period, Oregon developed a web application that determines the peak flow for any point along a stream. They also updated the state's 1971 publication *Regionalized Flood Frequency Data for Oregon* and assigned a staff hydrologist to revise runoff vs. basin curves using data collected from statewide individual stream gauging records from 1971 to 2000 while handing out grants to dam owners to run inundation analyses and hazard classification inundation analyses.



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Montana. Through Federal funding, Montana has developed a number of Technical Notes on a variety of dam engineering topics that were modeled after the State of Washington. The Technical Notes provide guidance to engineers on topics such as Spillway Adequacy Evaluation, Simplified Evacuation Mapping, Downstream Hazard Determination, Chimney Filter Design, and Construction for Small Earthen Dams. They are currently in the process of creating more Technical Notes on a *Simplified Seismic Analysis Procedure, Potential Failure Mode Analysis, and Specifications Requirements for Dams*. In the midst of creating new guidance documents, they have also reviewed and revised the state's Emergency Action Plan Evacuation Maps. Aerial photography informed the maps' creation. They also implemented a mobile surveillance system for monitoring problematic dams. Montana has also honed in on seismic hazards and their relevance to dam safety by developing seismic hazard standards and maps, the development of simplified seismic analysis techniques and software that determines ground-shaking severity after earthquakes.

Moreover, Montana's highly trained staff of consultants, college interns, and full-time employees have emphasized outreach while also conducting EAP tests around the state to ensure EAP's are up to date. Their outreach efforts included employing a High Hazard Dam Owner Awareness Program, annual dam owner workshops, assisting in the creation of an Association of Dam Owners, and the publication of material about dam inspections, dam construction, dam regulations, and similarly themed topics.



Increasing Dam Safety Public Awareness

Living with Dams: Know Your Risks

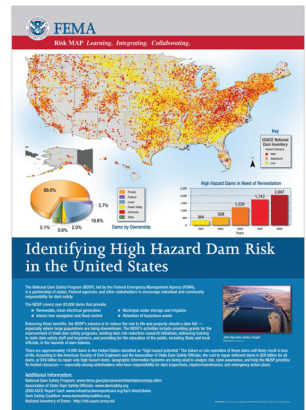
In collaboration with ASDSO, NDSP published this brochure in May 2012 and updated it in February 2013. It is the first NDSP publication targeted toward communicating dam safety risks to the general public. The brochure provides information for the public on the benefits and risks associated with dams and how to prepare for and mitigate dam hazard risks.

Interagency and Scientific Community Collaboration in the NID

2013 Update

The 2013 Army Corps of Engineers' (USACE) NID includes information on approximately 87,000 dams. 80 percent of the dams are regulated by State Dam Safety Offices while almost 70 percent of the entire inventory is composed of privately-owned dams. The Federal Government owns or regulates 6 percent of dams in the NID, which includes approximately 35 percent of the tallest dams. Dams in the NID are classified according to hazard potential, an indicator of the consequences of dam failure. Note, a dam's hazard potential classification does not indicate its condition.

The NID lists 14,726 dams classified as high-hazard potential, 12,406 significant hazard potential, 58,956 low hazard potential, and 1,271 undetermined. Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life. Significant hazard potential are those dams where failure or mis-operation results in no probable loss of human life but can cause economic loss. Dams assigned the low hazard potential classification are those where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. These losses are principally limited to the owner's property. More than 27,000 (32 percent) of the dams listed in the NID have a primary purpose of recreation and more than 15,000 (17 percent) are primarily for flood damage reduction and storm water management.



Training

An impressive amount of NDSP related training seminars and workshops were conducted in 2013. Organizations such as the Nuclear Regulatory Commission (NRC), USACE, ASDSO, Mine Safety and Health Administration, and FEMA itself led the efforts in Dam Safety training. Listed below are some of the highlights:

National Dam Safety Technical Seminar #20: Overtopping Protection for Dams.

This workshop, conducted at the Emergency Management Institute in Emmitsburg, MD on February 20-21, 2013, was designed to discuss the development of a nationally recognized source of information that is current and has consensus on a wide variety of overtopping protection systems to include model study results and prototype performance. Specifically, the technical guidance promoted greater consistency between similar overtopping protection projects designs. It also facilitated more effective and consistent review of such systems while aiding in design of safer, more reliable facilities. The information presented during the workshop can be incorporated into state and local emergency preparedness plans, response planning, and recovery efforts.

Workshop on Probabilistic Flood Hazard Assessment:

The NRC sponsored this workshop at its headquarters' auditorium in Rockville, MD on January 29 – 31, 2013. The workshop objectives were to: assess, discuss, and inform participants on, the state-of-the-practice for extreme flood assessments within a risk context with the following objectives; facilitate the sharing of information between both Federal agencies and other interested parties to bridge the current state-of-knowledge between extreme flood assessments and risk assessments of critical infrastructures; seek ideas and insights on possible ways to develop a Probabilistic Flood Hazard Assessment (PFHA) for use in probabilistic risk assessments; identify potential components of flood-causing mechanisms that lend themselves to probabilistic analysis and warrant further study (i.e., computer-generated storm events); establish realistic plans for coordination of PFHA research studies as the follow-up to the workshop observations and insights; and develop plans for a cooperative research strategy on PFHA for the workshop partners.

Abridged List of Training through the ASDSO:

ASDSO is a non-profit organization that serves state dam safety programs and the dam safety community nationwide. Representatives from each state make up the voting membership of ASDSO while the governing board is chosen from these 50 individuals. The vast majority of dams in the U.S. are regulated by state dam safety programs, and ASDSO's efforts to train professionals across the nation play a major role in enhancing NDSP's efforts to strengthen the Nation's dam infrastructure:

- Soil Mechanics for Dam Safety presented by the Missouri University of Science & Technology (MS&T). February 5-7, 2013 in Oklahoma City, OK.
- Dam Failures and Lessons Learned presented by McCook Geotechnical Engineering, PLLC. March 19-21, 2013 in Denver, CO.
- HEC-HMS presented by Dr. Art Miller, P.E., AECOM. April 16-17, 2013 in Chicago, IL.
- Construction Inspections and Plans & Specs Review presented by MWH Americas, Inc. June 25-26, 2013 in Pittsburgh, PA.
- Conduits, Valves and Gates presented by HDR Engineering, Inc. June 25-26, 2013 in Sacramento, CA.

Updated Policies and Guidance

FEMA 64, Federal Guidelines for Emergency Action Planning for Dams.

This document helps dam owners, in coordination with emergency management authorities, to effectively develop and exercise EAPs for dams. This document is an update of *FEMA 64, Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners (2004)*.



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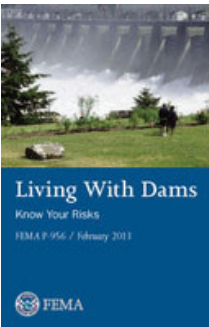
FEMA 94, Federal Guidelines for Dam Safety: Selecting and Accommodating Inflow Design Floods for Dams.

The main objective of these guidelines are to recommend appropriate procedures for selecting and accommodating the Inflow Design Flood. These procedures are based on current and accepted practices. The document promotes a reasonable degree of consistency and uniformity among state and federal agencies. Appropriate selection of Inflow Design Flood is the first step in evaluating and designing a dam to address hydrologic failure modes and reduce risk to the public.

FEMA P-946, Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures.

This document provides dam safety professionals with guidance on how to prepare dam breach inundation modeling studies and conduct mapping that can be used for multiple purposes, including dam safety, hazard mitigation, consequence evaluation, and emergency management including developing EAPs. This guidance is intended to provide a consistent approach that can be applied across the country.

FEMA P-956, Living With Dams: Know Your Risks.



Living With Dams: Know Your Risks is a booklet designed to help answer questions about dams: what purposes they serve, associated risks, guidance for those living near dams, and where to find further information. The booklet provides a general overview of dams and dam safety, and answers the following questions: Why should I care about dams? What are the risks associated with dams? Could I be affected by a dam? What is the dam failure flood inundation area? Once I determine that my property is in a dam break inundation area, what's next?

All of FEMA's publications can be located in the FEMA Resource and Document Library at www.fema.gov/Library.

National Dam Safety Review Board and Interagency Committee on Dam Safety: The Work Continues

The NDSRB and ICODS meet on a quarterly basis. Future activities it hopes to accomplish include:

- Promote the sharing and communication of dam risk information between Federal, state, tribal and local officials by developing a playbook for use by state dam safety programs, FEMA Regions, and the FEMA National Flood Insurance Program. It will include conversations with professionals and present available products, including sample dam operation plans.
- Work through partners and appropriate communications channels for information distribution.
- Expand National Dam Safety Awareness Day activities in future years to include all 50 States.
- Deliver “Dam Safety 101” training to a wider audience, including dam owners, emergency managers, and the general public.
- Support or participate in dam safety and awareness events (where feasible), such as International Commission on Large Dams and other events to spread the dam safety awareness message.





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