



# Catalog of FEMA National Dam Safety Program Resources

FEMA P-732 / January 2021



FEMA

These publications have been developed by the National Dam Safety Program (NDSP) of the Federal Emergency Management Agency (FEMA).

Please visit <https://www.fema.gov/emergency-managers/risk-management/dam-safety/publications> to view or download publications.

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# Catalog of FEMA National Dam Safety Program Resources

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# How to Find Resources Online

Finding National Dam Safety Program resources online is simple.

1. Visit <https://www.fema.gov/emergency-managers/risk-management/dam-safety/publications> to view the full list of resources.
2. Scroll down to the search bar and type in the title of the publication you are looking for or a keyword to search for it.

## Search for Dam Safety Publications

The screenshot shows a search interface with a text input field labeled "Search by Title or Keyword", a "Sort by" dropdown menu currently set to "Publication Date", and a blue "Apply" button.

3. You can sort the results by publication date or alphabetically by name.

The screenshot shows the "Sort by" dropdown menu expanded, with options "Publication Date" and "Name". The "Publication Date" option is highlighted in blue. An "Apply" button is visible at the bottom left of the menu.

4. Select apply to view the search results.

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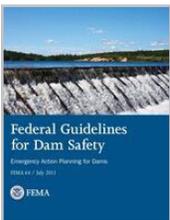
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# DAM SAFETY RESOURCES

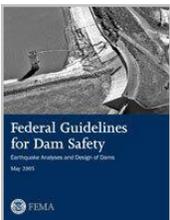
## FEDERAL GUIDELINES FOR DAM SAFETY

In June 1979 the ad hoc Interagency Committee on Dam Safety (ICODS) issued the first guidelines for federal agency dam owners (Federal Guidelines for Dam Safety, FEMA P-93). To supplement the Federal Guidelines for Dam Safety, ICODS has prepared and approved federal guidelines in the areas of emergency action planning; earthquake analyses and design of dams; selecting and accommodating inflow design floods for dams; and hazard potential classification system for dams. ICODS has prepared and approved the following federal guidelines for federal agency dam owners and regulators. These guidelines may also be used by non-federal dam owners, regulators and operators.



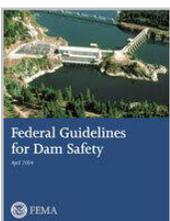
### ***FEMA P-64 – Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners (July 2014)***

This document provides guidance to help dam owners, in coordination with emergency management authorities, effectively develop and exercise emergency action plans for dams. The purpose of the guidance in this document is to meet that need. This document is an update of FEMA P-64, Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners (2004).



### ***FEMA P-65 – Federal Guidelines for Dam Safety: Earthquake Analyses and Design of Dams (May 2005)***

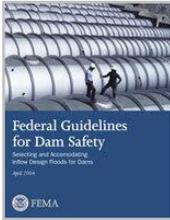
These guidelines provide the basic framework for the earthquake design and evaluation of dams. The general philosophy and principles for each part of the framework are described in sufficient detail to achieve a reasonable degree of uniform application among the federal agencies involved in the planning, design, construction, operation, maintenance, and regulation of dams. The guidelines are presented in four parts: selection of design or safety evaluation for earthquakes; characterization of ground motions; seismic analyses of the dams and foundations; and evaluation of structural adequacy for earthquake loading.



### ***FEMA P-93 – Federal Guidelines for Dam Safety (April 2004)***

These guidelines encourage strict safety standards in the practices and procedures employed by federal agencies or required of dam owners regulated by the federal agencies. The guidelines provide the most complete and authoritative statement available of the desired management practices for promoting dam safety and the welfare of the public. The guidelines apply to federal practices for dams with a direct federal interest; the guidelines do not attempt to establish technical standards and are not intended to supplant or conflict with state or local government responsibilities for the safety of dams under their jurisdiction.

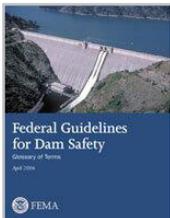
# DAM SAFETY RESOURCES



## ***FEMA P-94 – Federal Guidelines for Dam Safety: Selecting and Accommodating Inflow Design Floods for Dams (August 2013)***

These guidelines provide thorough and consistent procedures for selecting and accommodating inflow design floods (IDFs), the flood flow above which the incremental increase in water surface elevation downstream due to the failure of a dam or other water retaining structure no longer presents an unacceptable additional downstream threat. These guidelines are not intended to provide a complete manual of all procedures for estimating IDFs; the selection of procedures is dependent upon available hydrologic data and individual watershed characteristics.

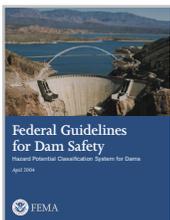
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## ***FEMA P-148 – Federal Guidelines for Dam Safety: Glossary of Terms (April 2004)***

This glossary provides a common terminology for dam safety for use within and among federal agencies. The terms are generic and applicable to all dams, regardless of size, owner, or location.

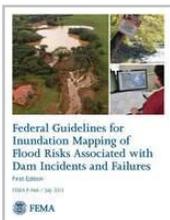
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## ***FEMA P-333 – Federal Guidelines for Dam Safety: Hazard Potential Classification System for Dams (April 2004)***

Existing hazard potential classification systems are numerous and vary within and between the federal and state sectors. These guidelines set forth a hazard potential classification system for dams that is simple, clear, concise, and adaptable to any agency's current system. The intent is to provide straightforward definitions that can be readily understood by the public and applied uniformly by all federal and state dam safety agencies. The guidelines do not establish how the system will be used, such as prescribing specific design criteria or prioritizing inspections. Those responsibilities remain with the responsible regulatory authority.

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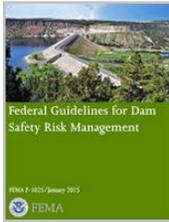


## ***FEMA P-946 – Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures (July 2013)***

The purpose of this document is to provide 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 emergency action plans. This guidance is intended to provide a consistent approach that can be applied across the country.

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# DAM SAFETY RESOURCES



## **FEMA P-1025 – *Federal Guidelines for Dam Safety Risk Management* (January 2015)**

This document provides guidelines for implementing risk-informed decision making in a dam safety program. The intended audience is federal agencies that own or regulate dams. The guidelines could also be applied to non-federally owned or regulated dams that can impact federally owned or regulated facilities; however, this would require the cooperation and involvement of the non-federal dam owner.

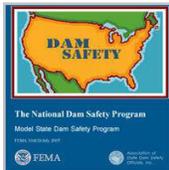
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## **NATIONAL DAM SAFETY PROGRAM INFORMATION**



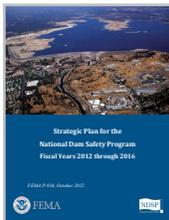
## ***Analyzing the Dam Failure Hazard in the Hazard Mitigation Assistance Program Benefit Cost Analysis***

FEMA and DHS offer the following frequently asked questions, references, and resources. In addition, each state dam safety program may have additional guidance and requirements.



## **FEMA P-316 CD – *Model State Dam Safety Program* (July 2007)**

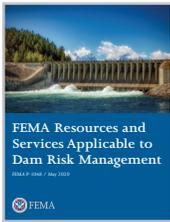
There is great variance in the effectiveness of state dam safety programs. Although some of this variance may be appropriate as each state must address its dam safety needs and responsibilities in its own way, some state programs are not considered adequate. Many unsafe dams also have been identified and any required remedial action has not been implemented. The Model State Dam Safety Program was first developed in 1987, updated in 1997, and updated again in 2006 to assist state officials in initiating or improving their state programs. The document outlines the key components of an effective dam safety program and provides guidance on the development of more effective and sustainable state programs to eliminate the risks created by unsafe dams.



## **FEMA P-916 – *National Dam Safety Program Strategic Plan Fiscal Years 2012 through 2016* (October 2012)**

This Strategic Plan for the National Dam Safety Program (NDSP) for fiscal years 2012 through 2016 was developed to present the goals and objectives established by FEMA and its partners in the NDSP to reduce the hazards from dam failures and demonstrate the benefits of dams in the United States.

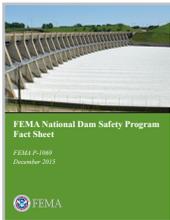
# DAM SAFETY RESOURCES



## **FEMA P-1068 - *FEMA Resources and Services Applicable to Dam Risk Management* (December 2015)**

The purpose of this document is to identify FEMA resources and services that are applicable to support dam hazard risk mitigation, preparedness, response or recovery. The goal is to view the various directorates and programs within FEMA to determine the eligibility or applicability of the resources or services they offer and how they may address your identified needs.

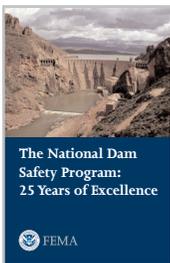
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## **FEMA P-1069 – *FEMA National Dam Safety Program Fact Sheet* (November 2016)**

As the lead federal agency for the National Dam Safety Program, FEMA is responsible for coordinating efforts to secure the safety of dams throughout the United States. The program makes federal funds available to the states, which are primarily responsible for protecting the public from dam failures of non-federal dams, and pursuing initiatives that enhance the safety of dams posing the greatest risk to people and property.

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## **FEMA L-262 – *The National Dam Safety Program: 25 Years of Excellence***

FEMA has provided leadership of the National Dam Safety Program for over 25 years. This brochure provides the general public with an overview of FEMA's role as lead agency and the responsibilities of the federal agencies that own, regulate, operate, and maintain dams. The brochure also describes the benefits of dams, including irrigation, electric power generation, flood control, and water storage.

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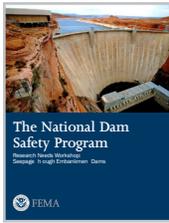
## ***National Dam Safety Program Annual Year in Reviews***

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 it 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 NDSP has been able to achieve since its inception.

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

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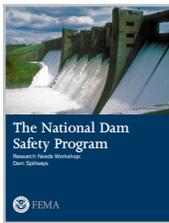
## RESEARCH NEEDS WORKSHOP REPORTS



### ***FEMA P-535 – National Dam Safety Program Research Needs Workshop: Seepage through Embankment Dams (September 2005)***

This workshop report documents expert consideration of (1) potential seepage problems and solutions associated with penetrations through embankment dams, e.g., outlet works conduits; (2) filter design criteria and observed performance; (3) inspection of dams for detection of seepage problems, failure modes associated with seepage and internal erosion, and analysis of risks associated with seepage and internal erosion; (4) investigation of seepage problems and concerns at dams, including the use of geophysical techniques, and instrumentation and measurements for evaluation of seepage performance; (5) remediation of seepage problems through cutoff, reduction of flow, and collection and control of seepage, including the use of geosynthetics; and (6) impacts of the aging of seepage control and collection system components on seepage performance.

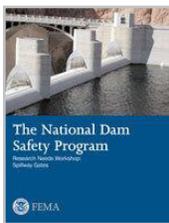
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### ***FEMA P-536 – National Dam Safety Program Research Needs Workshop: Dam Spillways (September 2005)***

This workshop report documents the state of practice concerning cost-effective techniques for the enlargement, modification, inspection, monitoring, and maintenance of dam service and emergency spillways. The report discusses dam safety research needs related to dam spillways, especially the short-term and long-term needs of the federal and non-federal dam safety community. It also recommends a course of action to address those research needs.

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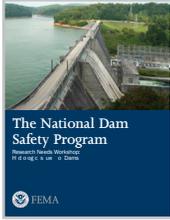


### ***FEMA P-537 – National Dam Safety Program Research Needs Workshop: Spillway Gates (September 2005)***

One of the outcomes of the Folsom tainter gate failure was the recognition of the need to revisit the issues related to gate performance and safety. This workshop report documents lessons learned from the Folsom tainter gate failure and applies those lessons across the broad spectrum of spillway gates. The report provides recommendations for future action and serves as a reference for regulatory agencies as they refine their requirements in this area.

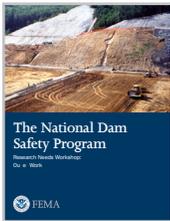
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# DAM SAFETY RESOURCES



## **FEMA P-538 – *National Dam Safety Program Research Needs Workshop: Hydrologic Issues for Dams (September 2005)***

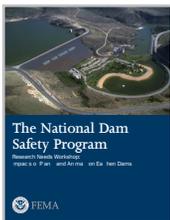
This workshop report documents expert findings in three areas: risk analysis, standards, and meteorological needs. Risk analysis focuses on items relating to uncertainty factors that influence reservoir inflow values and the computation of the Annual Exceedance Probability of extreme floods. Standard issues include physical factors that influence the methodology for the computation of extreme floods, including the Probable Maximum Flood. Meteorological needs focus on rainfall analysis from both the standards base analysis and a risk-based analysis, including precipitation analysis, rainfall frequency analysis, and real-time storm analysis.



## **FEMA P-539 – *National Dam Safety Program Research Needs Workshop Report: Outlet Works (August 2006)***

This report addresses:

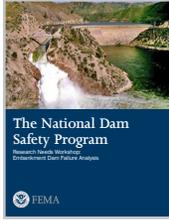
1. outlet works failure modes, including failure by seepage and piping along the outlet works conduit;
2. conduit materials, selection criteria, and construction methods, including pipe material types and their advantages, disadvantages, and appropriate applications;
3. gates, valves, and controls, including types of gates and valves and their applications;
4. energy dissipaters, including stilling basins and energy dissipating valves;
5. rehabilitation of conduits, including in-place rehabilitation and replacement; and
6. outlet works inspection, including the determination of appropriate frequency; systems, methods, and techniques; and consideration of design criteria to accommodate inspection.



## **FEMA P-540 – *National Dam Safety Program Research Needs Workshop: Impacts of Plants and Animals on Earthen Dams (April 2003)***

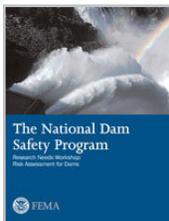
Several areas for future development related to the impacts of plants and animals on earthen dams are documented in this report, including (1) the development of tools to educate dam owners and engineers on how to spot problems caused by plant and animal penetrations, how to prevent these problems from occurring, and how to mitigate or repair existing problems; (2) the analysis of tools and methods for repairing animal burrows on dams; and (3) collaboration with other groups, such as federal wildlife agencies that have research programs in place.

# DAM SAFETY RESOURCES



## ***FEMA P-541 – National Dam Safety Program Research Needs Workshop: Embankment Dam Failure Analysis (September 2005)***

For this workshop, 35 national and international experts participated in discussions on research and new technology related to risk assessment, embankment dam failure, and flood routing. The experts identified 14 priority areas for research, including the updating, revision, and dissemination of the historic data set/database of dam failures; development of forensic guidelines and standards for dam safety expert use; identification of critical parameters for different types of failure modes; and basic physical research to model different dam parameters, with the intent to verify the ability to model actual dam failure characteristics and extend dam failure knowledge using scale models.



## ***National Dam Safety Program Research Needs Workshop: Risk Assessment for Dams***

This workshop report presents the detailed discussions of federal, state, and private sector experts on the three areas of risk assessment applications for dam safety: failure modes identification; portfolio risk assessment and index prioritization approaches; and detailed quantitative approaches. Because the information needs of organizations vary widely, the workshop report acknowledges that it is not feasible for a single risk assessment approach to meet the needs of all organizations.

## **DAM SAFETY TECHNICAL MANUALS AND GUIDES**

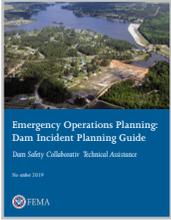


## ***Dam Safety Technical Advisories (February 2018)***

The Dam Safety Technical Advisories help people and organizations better understand the various measures that can be taken to reduce the risks from and improve resilience to dam failure. The intended audience includes federal, state, and local officials; tribal leaders; county and city engineers, planners, and emergency managers; dam owners and operators; building and property owners near or potentially affected by a dam failure; and other interested stakeholders. There are 3 technical advisories:

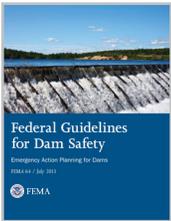
1. Risk Reduction Measures for Dams
2. Risk Exposure and Residual Risk Related to Dams
3. Dam Awareness

# DAM SAFETY RESOURCES



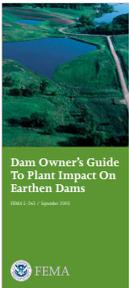
## ***Emergency Operations Planning: Dam Incident Planning Guide (November 2019)***

This Dam Incident Planning Guide supports state, local, tribal, and territorial emergency managers in planning for dam incidents and failures by summarizing the concepts that a community should consider when creating dam incident-specific elements of local emergency operations plans. This guide builds on Comprehensive Preparedness Guide (CPG) 101: Developing and Maintaining Emergency Operations Plans.<sup>1</sup> It also provides guidance for dam owners and operators on how to engage with emergency managers prior to an incident to ensure a well-coordinated response. Appendix A provides a general template for a community dam incident plan that can be adapted to meet each community's needs.



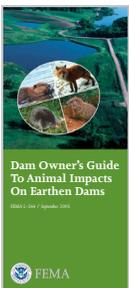
## ***FEMA P-64 – Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners (July 2013)***

This document provides guidance to help dam owners, in coordination with emergency management authorities, effectively develop and exercise emergency action plans for dams. The purpose of the guidance in this document is to meet that need. This document is an update of FEMA P-64, Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners (2004).



## ***FEMA L-263 – Dam Owner's Guide to Plant Impact on Earthen Dams (September 2005)***

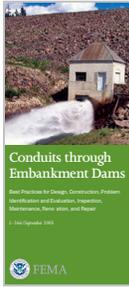
The dam owner is the first line of defense in the appropriate maintenance and safe operation of dams. This brochure describes the dangers presented by problem vegetation on earthen embankment dams and discusses how to identify problem vegetation. A quick quiz is included for dam owners to determine whether their dam may be at risk for problems related to inappropriate vegetation.



## ***FEMA L-264 – Dam Owner's Guide to Animal Impacts on Earthen Dams (September 2005)***

This brochure is designed to help the dam owner manage and reduce nuisance wildlife and wildlife damages at earthen dams. The brochure provides information on the types of nuisance wildlife damages, wildlife observation during routine inspections, wildlife identification, and basic damage repair.

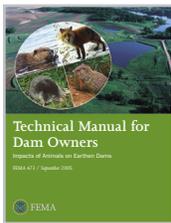
# DAM SAFETY RESOURCES



## **FEMA L-266 – *Conduits through Embankment Dams: Best Practices for Design, Construction, Identification and Evaluation, Inspection, Maintenance, Renovation, and Repair* (September 2005)**

This brochure provides a summary of the information presented in FEMA P-484, Technical Manual: Conduits through Embankment Dams, including the effects of conduits on embankment dams, internal erosion and backward piping erosion, the factors that can lead to embankment dam failure, and best practices for conduits through embankment dams.

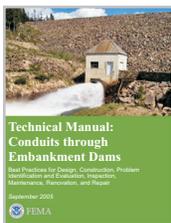
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## **FEMA P-473 – *Technical Manual for Dam Owners: Impacts of Animals on Earthen Dams* (September 2005)**

Safe dam operation includes comprehensive, state-of-practice guidance on timely inspection and observation of wildlife damages, accurate wildlife identification and mitigation, and appropriate dam design, repair, and preventive measures. This technical manual provides guidance to dam specialists, including dam owners, operators, inspectors, state dam officials, and consulting engineers, in the following areas: (1) the impacts wildlife can have on earthen dams; (2) habitat, range, description, and behavior of common nuisance wildlife to aid in the proper identification at the dam; (3) state-of-practice methods to prevent and mitigate adverse wildlife impacts on earthen dams; and (4) state-of-practice design guidance for repair and preventive design associated with nuisance wildlife intrusion.

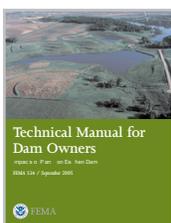
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## **FEMA P-484 – *Technical Manual: Conduits through Embankment Dams* (September 2005)**

This technical manual provides procedures and guidance for “best practices” for the design, construction, problem identification and evaluation, inspection, maintenance, renovation, and repair associated with conduits through embankment dams. The technical manual is intended for use by personnel familiar with embankment dams and conduits, such as designers, inspectors, construction oversight personnel, and dam safety engineers. The DVD format includes an extensive collection of “additional reading” references.

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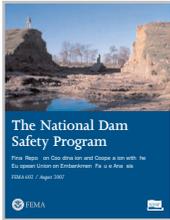


## **FEMA P-534 – *Technical Manual for Dam Owners: Impacts of Plants on Earthen Dams* (September 2005)**

The purpose of this technical manual for dam owners is to advance awareness of the characteristics and seriousness of dam safety problems associated with tree and woody vegetation growth impacts on earthen dams, provide a higher level of understanding of dam safety issues by reviewing current damage control policies, provide state-of-practice guidance for remediation design considerations associated with damages associated with tree and woody vegetation growth on earthen dams, and to provide rationale and state-of-practice techniques and procedures for management of desirable and undesirable vegetation on earthen dams.

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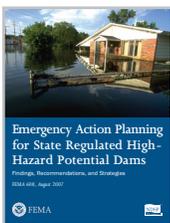
# DAM SAFETY RESOURCES



## ***FEMA P-602 and P-602 CD – Final Report on Coordination and Cooperation with the European Union on Embankment Failure Analysis (August 2007)***

There has been an emphasis in the European Union (EU) community on the investigation of extreme flood processes and the uncertainties related to these processes. Over a 3-year period, the EU and the U.S. dam safety community (1) coordinated their efforts and collected information needed to integrate data and knowledge with U.S. activities and interests related to embankment overtopping and failure analysis; (2) used the data to improve embankment failure analysis methods; and (3) disseminated the results to the U.S. dam safety community. This final report integrates EU and U.S. research findings and results related to earthen embankment overtopping failure over the 3-year period.

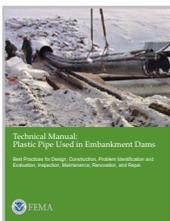
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## ***FEMA P-608 – Emergency Action Planning for State Regulated High-Hazard Potential Dams: Findings, Recommendations, and Strategies (August 2007)***

Preventing loss of life from dam failure is the paramount concern of the National Dam Safety Program. This concern has intensified as a result of recent disasters that have focused attention on the state of the critical infrastructure in the United States and raised questions on the safety of dams nationwide. As part of a recent initiative to promote the implementation of emergency action plans at all high-hazard potential dams across the United States, FEMA has asked all of the states to adopt the applicable recommendations contained in this paper.

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## ***FEMA P-675 – Technical Manual: Plastic Pipe Used in Embankment Dams (November 2007)***

This technical manual provides the procedures and guidance for “best practices” concerning the design, construction, problem identification and evaluation, inspection, maintenance, renovation, and repair associated with plastic pipe used in embankment dams. The manual provides in-depth analyses of loading conditions, structural design, and hydraulic design of plastic pipe, and is intended for use by personnel familiar with embankment dams, drains, siphons, and conduits, such as designers, inspectors, construction oversight personnel, and dam safety engineers.

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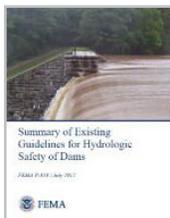


## ***FEMA P-911 – Pocket Safety Guide for Dams and Impoundments (October 2016)***

This Pocket Safety Guide for Dams and Impoundments was developed for dam owners and other people as a quick reference when assessing low hazard dams and impoundments. For in depth discussion, please refer to the U.S. Fish and Wildlife Service’s Low Hazard Dams—Standing Operating Procedures or FEMA P-145, Dam Safety: An Owner’s Guidance Manual.

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# DAM SAFETY RESOURCES



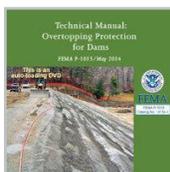
## **FEMA P-919 – *Summary of Existing Guidelines for Hydrologic Safety of Dams (August 2012)***

The overriding purpose of this report is to document the available data and to present the state of the practice for evaluating the hydrologic safety of dams, including inventorying current practices used by state and federal agencies. This work included a review of hydrologic guidelines currently used in each state and federal agency that regulates dams and was guided by an independent steering committee and reviewed by the Research Work Group. A subsequent publication will include new federal guidelines for the evaluation of the hydrologic safety of dams that could be applied nationwide.



## **FEMA P-946 – *Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures (July 2013)***

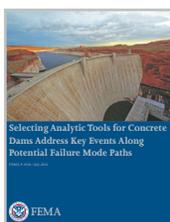
The purpose of this document is to provide dam safety professionals with guidance on how to prepare dam breach inundation modeling studies and conduct mapping that can be used for multiple purposes, including dam safety, hazard mitigation, consequence evaluation, and emergency management including developing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



## **FEMA P-1014 and P-1015 – *Technical Manual: Overtopping Protection for Dams Brochure and DVD (May 2014)***

Inadequate spillway capacity is a common problem with many dams. Thousands of dams throughout North America have been determined to have inadequate spillway capacity and would be overtopped during the inflow design flood. Dam failure from overtopping can lead to a potential for loss of life and significant downstream damages. Thus, new design approaches have been developed that may allow for the dam to be safely overtopped.

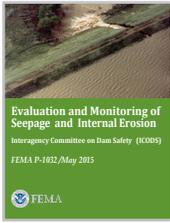
The design and construction of overtopping protection for dams is increasingly being viewed as a viable alternative to larger spillways as developing watersheds or changing hydrology produce higher peak flows.



## **FEMA P-1016 – *Selecting Analytic Tools for Concrete Dam Address Key Events Along Potential Failure Mode Paths (July 2014)***

In this document, failure is considered the uncontrolled release of the reservoir. Failure results from sequences of events that must follow one upon another. This document introduces event trees. Event trees are pictorial representations of the sequences of events (called nodes) leading to failure. The possibility of each node occurring is evaluated by analyses. Examples presented are for instructional purposes only. Assumptions made, material properties used, and loadings were selected to illustrate structural analysis methods and failure modes and are not generally applicable.

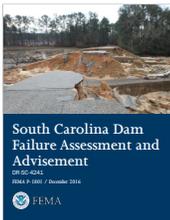
# DAM SAFETY RESOURCES



## ***FEMA P-1032 – Evaluation and Monitoring of Seepage and Internal Erosion (May 2015)***

Internal erosion occurring at federal (and nonfederal) embankment dams and levees poses a threat of failure and potential risk to public safety. This document presents a summary of current federal practices for monitoring and measuring seepage, identifying potential failure modes related to internal erosion, assessing risk related to internal erosion, and remediating internal erosion. While research continues into these processes, this document attempts to present the best understanding based on current federal agency practice. Hence, very recent or new, unproven technologies are not discussed.

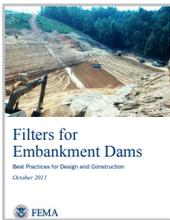
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## ***FEMA P-1801 – South Carolina Dam Failure Assessment and Advisement (December 2016)***

From October 1 through 5, 2015, heavy rainfall over parts of South Carolina resulted in the failure of 49 state regulated dams, one federally regulated dam, two sections of the levee adjacent to the Columbia Canal, and many unregulated dams. In support of recovery efforts, FEMA Mitigation deployed a team to assist in the assessments of dams and provide expertise and insights to the State of South Carolina, FEMA Headquarters, FEMA Region IV, and Joint Field Office leadership.

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## ***Filters for Embankment Dams – Best Practices for Design and Construction (October 2011)***

This document provides procedures and guidance for best practices concerning embankment dam filter design and construction and represents an effort to collect and disseminate current information and experience having a technical consensus. This document is intended for use by personnel familiar with embankment dams, such as designers, inspectors, construction oversight personnel, and dam safety engineers.

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## VIDEOS, SOFTWARE, AND PRESENTATIONS



## ***2019 NDSP Technical Seminar Presentations (February 2019)***

The National Dam Safety Review Board Work Group on Dam Safety Training welcomed all dam and levee safety professionals and those responsible for responding to dam and levee safety incidents to the annual National Dam Safety Program Technical Seminar (NDSPTS).

The 2019 National Dam Safety Technical Program Technical Seminar was February 20-21, 2019, on the campus of the National Emergency Training Center (NETC) in Emmitsburg, Maryland. The theme for 2019 was Information Sharing and Risk Communication on the Hazards Associated with Dams and Levees. The NDSPTS attracts on average 220 attendees per year where industry topics are discussed and ample opportunities are provided to network with others with an interest in the safety of dams and levees.

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# DAM SAFETY RESOURCES



## ***2020 NDSP Technical Seminar Presentations (February 2020)***

The National Dam Safety Review Board Work Group on Dam Safety Training welcomed all dam and levee safety professionals and those responsible for responding to dam and levee safety incidents to the annual National Dam Safety Program Technical Seminar (NDSPTS).

The 2020 National Dam Safety Technical Program Technical Seminar took place February 19-20, 2020, on the campus of the National Emergency Training Center (NETC) in Emmitsburg, Maryland. This year, 225 individuals were in attendance. This seminar highlighted and shared advances in the science and engineering for prediction and estimation of extreme storm events, hydrologic and hydraulic forecasting and decision support and dam engineering design. Below, please find the 2020 National Dam Safety Technical Program Technical Seminar presentations. The presentations provide historical perspective, recent extreme event case histories and state-of-the-practice methods and tools.



## ***Emergency Action Planning Video***

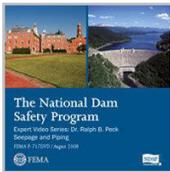
This videotape presents the discussion of federal and state dam safety experts on the various aspects of emergency action planning for dams, including the components of an Emergency Action Plan (EAP) and how to assess whether a dam requires an EAP. An audio version of the expert discussions is available in CD-ROM format.



## ***FEMA P-1010 – Geospacial Dam Break, Rapid EAP, Consequence and Hazards GIS Toolkit and User Manual (October 2013)***

This DVD has a suite of ArcGIS tools designed to support the development of simplified dam break studies, Risk Mapping, Assessment and Planning (Risk MAP) datasets, loss of life assessments, Emergency Action Plans (EAPs), and EAP map panel creation. This version of GeoDam-BREACH can be used for various workflows including: Simplified Dam Break Studies, Risk MAP Datasets, Loss of Life Assessment, EAP Map Panel Creation, and EAP Development. The Users Guide is a part of the CD. Dam Safety officials across America is the targeted audience.

# DAM SAFETY RESOURCES



## **FEMA P-717 DVD through P-722 DVD – *Expert Video Series* (August 2008)**

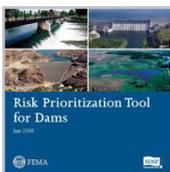
The Expert Video Series was developed for the National Dam Safety Program by the Interagency Committee on Dam Safety and the Department of the Interior, Bureau of Reclamation. The six videos present the following experts and topics:

1. FEMA P-717DVD: Dr. Ralph B. Peck; Seepage and Piping
2. FEMA P-718DVD: Dr. Don U. Deere; Dam Foundations
3. FEMA P-719DVD: Dr. John Lowe, III; Filters and Sinkholes and Rapid Drawdown Stability
4. FEMA P-720DVD: Dr. James K. Mitchell; Ground Improvement for Dam Safety
5. FEMA P-721DVD: Dr. I.M. Idriss; Behavior of Embankment Dams During Earthquakes
6. FEMA P-722DVD: Dr. Danny L. Fread; Dam Breach and Flood Wave Modeling Geospatial Dam Break, Rapid EAP, Consequence and Hazards GIS



## **FEMA P-609 CD – *Training Aids for Dam Safety (TADS): A Self-Instructional Study Course in Dam Safety Practices* (September 2007)**

TADS is a self-contained, self-paced training course consisting of 21 modules for engineers, technicians, dam owners and operators, water resource managers, dam safety program managers, public officials, and the public. The modules were developed by technical experts from participating federal and state agencies and are organized into three components: Dam Safety Inspection; Dam Safety Awareness, Organization, and Implementation; and Data Review, Investigation, Analysis and Remedial Actions for Dam Safety.



## **FEMA P-713 – *Risk Prioritization Tool for Dams* (June 2008)**

The Risk Prioritization Tool for Dams is a standards-based decision-making tool for risk-based dam safety prioritization to be used by state dam safety regulators throughout the country to identify those dams within a large inventory that most urgently need attention and then allocate resources accordingly. The tool is applicable to any type or number of dams, avoids subjectivity and bias, and is defensible and reproducible.

# DAM SAFETY RESOURCES



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## RESOURCES FOR THE GENERAL PUBLIC



### ***Be Aware of Potential Risk of Dam Failure in Your Community***

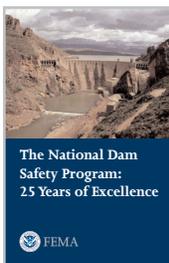
This two-page flyer is for the general public. Approximately 14,000 dams in the United States are classified as high-hazard potential, meaning that their failure could result in loss of life. The most important steps you can take to protect yourself from dam failure are to know your risk. Dams present risks, but they also provide many benefit.



### ***Dam Safety Technical Advisories (February 2018)***

The Dam Safety Technical Advisories help people and organizations better understand the various measures that can be taken to reduce the risks from and improve resilience to dam failure. The intended audience includes federal, state, and local officials; tribal leaders; county and city engineers, planners, and emergency managers; dam owners and operators; building and property owners near or potentially affected by a dam failure; and other interested stakeholders. There are 3 technical advisories:

1. Risk Reduction Measures for Dams
2. Risk Exposure and Residual Risk Related to Dams
3. Dam Awareness



### ***FEMA L-262 – The National Dam Safety Program: 25 Years of Excellence***

FEMA has provided leadership of the National Dam Safety Program for over 25 years. This brochure provides the general public with an overview of FEMA's role as lead agency and the responsibilities of the federal agencies that own, regulate, operate, and maintain dams. The brochure also describes the benefits of dams, including irrigation, electric power generation, flood control, and water storage.

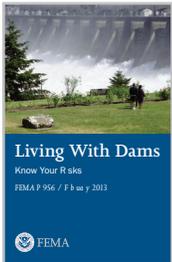
# DAM SAFETY RESOURCES



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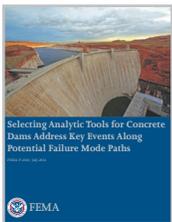
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## **FEMA P-956 – *Living with Dams: Know Your Risk* (February 2013)**

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:

1. Why should I care about dams?
  2. What are the risks associated with dams?
  3. Could I be affected by a dam?
  4. What is the dam failure flood inundation area?
  5. Once I determine that my property is in a dambreak inundation area, what's next?
- 

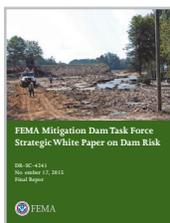


## **FEMA P-1016 – *Selecting Analytic Tools for Concrete Dam Address Key Events Along Potential Failure Mode Paths* (July 2014)**

In this document, failure is considered the uncontrolled release of the reservoir. Failure results from sequences of events that must follow one upon another. This document introduces event trees. Event trees are pictorial representations of the sequences of events (called nodes) leading to failure. The possibility of each node occurring is evaluated by analyses. Examples presented are for instructional purposes only. Assumptions made, material properties used, and loadings were selected to illustrate structural analysis methods and failure modes and are not generally applicable.

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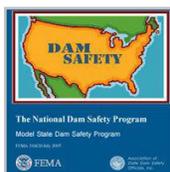
## POLICY PAPERS AND GUIDELINES



### **FEMA DR-SC-4241 – *FEMA Mitigation Dam Task Force Strategic White Paper on Dam Risk* (November 2017)**

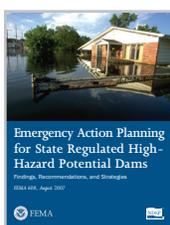
From October 1–5, 2015, heavy rainfall over parts of South Carolina resulted in the failure of 31 state regulated dams, one federal dam, two sections of the levee adjacent to the Columbia Canal, and many unregulated dams. A Dam Task Force was deployed by FEMA Mitigation in support of recovery efforts. The group was tasked to assess the dams and provide their expertise and insights to the State of South Carolina, FEMA HQ, FEMA Region IV, and Joint Field Office leadership.

This report is limited in scope and provides the context by which risks related to dams and dam failures are managed in South Carolina, with some implications nationwide.



### **FEMA P-316 CD – *Model State Dam Safety Program* (July 2007)**

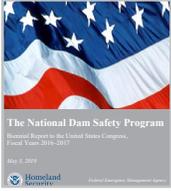
There is great variance in the effectiveness of state dam safety programs. Although some of this variance may be appropriate as each state must address its dam safety needs and responsibilities in its own way, some state programs are not considered adequate. Many unsafe dams also have been identified and any required remedial action has not been implemented. The Model State Dam Safety Program was first developed in 1987, updated in 1997, and updated again in 2006 to assist state officials in initiating or improving their state programs. The document outlines the key components of an effective dam safety program and provides guidance on the development of more effective and sustainable state programs to eliminate the risks created by unsafe dams.



### **FEMA P-608 – *Emergency Action Planning for State Regulated High-Hazard Potential Dams: Findings, Recommendations, and Strategies* (August 2007)**

Preventing loss of life from dam failure is the paramount concern of the National Dam Safety Program. This concern has intensified as a result of recent disasters that have focused attention on the state of the critical infrastructure in the United States and raised questions on the safety of dams nationwide. As part of a recent initiative to promote the implementation of emergency action plans at all high-hazard potential dams across the United States, FEMA has asked all of the states to adopt the applicable recommendations contained in this paper.

# DAM SAFETY RESOURCES

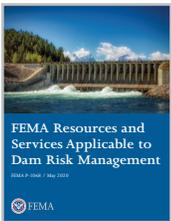


## *The National Dam Safety Program Biennial Reports to Congress*

The Dam Safety Act of 2006 (Public Law 109-460) requires the FEMA Administrator to submit a report to Congress that (1) describes the status of the National Dam Safety Program (NDSP); (2) describes the progress achieved by Federal agencies during the two preceding fiscal years (FYs) in implementing the Federal Guidelines for Dam Safety; (3) describes the progress achieved in dam safety by States participating in the Program; and (4) includes recommendations for legislative and other action that the Administrator considers necessary.

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## GRANT RESOURCES



## *FEMA P-1068 - FEMA Resources and Services Applicable to Dam Risk Management (December 2015)*

The purpose of this document is to identify FEMA resources and services that are applicable to support dam hazard risk mitigation, preparedness, response or recovery. The goal is to view the various directorates and programs within FEMA to determine the eligibility or applicability of the resources or services they offer and how they may address your identified needs.

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## *High Hazard Potential Dam Rehabilitation Grant Program Resources*

The High Hazard Potential Dam Rehabilitation Grant Program (HHPD) resources page is a collection of documents used to support the application process and management of the grant program. The types of documents include fact sheets, templates, checklists, guidance documents, and recorded webinars.

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## *FEMA Policy 104-008-7 - Rehabilitation of High Hazard Potential Dams Grant Program Guidance (June 2020)*

The purpose of FEMA's Rehabilitation of High Hazard Potential Dams Grant Program Guidance is to establish the framework and requirements to implement the HHPD grant program. This Guidance document is incorporated by reference as part of FEMA Policy 104-008-7 as FEMA's official policy on, and interpretation of, the requirements for implementation of FEMA's HHPD grant program. It is a comprehensive document detailing the specific criteria of the program and provides information for eligible applicants on how to apply for HHPD funding for a rehabilitation project. It supplements the information provided in Notice of Funding Opportunity and carefully outlines strategies for the rehabilitation process by interpreting the federal statutes, regulations, and best practices..

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## OTHER RESOURCES



### *Dam Safety and Risk MAP / Flood Mapping Studies Fact Sheet Series (November 2018)*

The Dam Safety Fact Sheets below were developed by FEMA Region IV and provide information on risk communication and the residual risk of dams in Risk MAP, dam considerations in flood mapping studies, and dam safety awareness.

1. **Dam Considerations in Flood Mapping Studies:** Whether for flood control, water supply, or recreation, dams play an important role in serving the community and managing a natural resource, but there are hazards and risks to consider when large volumes of water are stored.
2. **Considering the Residual Risk from Dams in Flood Risk Products:** During a flood mapping project, to properly assess and communicate a complete view of the flood risk both upstream and downstream of a dam, it is critical to consider the effects of dams and their associated residual risk.
3. **Risk Communication for Dams in Risk MAP:** Risk communication can help increase knowledge, understanding, and awareness of dams and the risks they pose. While dams can serve many purposes, such as flood risk reduction, hydropower generation, water supply, and recreation, many people in communities near dams are unprepared to deal with the impacts of a dam failure or dam-related flooding.
4. **Dam Safety Awareness:** Increased awareness of dams and the risks they pose is an important part of dam risk management. Hazards from dams can be triggered by severe weather events, improper operation of the dam, or regular or emergency releases of water downstream.



### *Dam Safety Collaborative Technical Assistance (CTA) Summary Sheets (December 2019)*

The Federal Emergency Management Agency (FEMA) is offering a Collaborative Technical Assistance (CTA) series to help communities at risk of dam-related flooding to better understand their risk landscape and the potential consequences of dam-related emergencies. The CTA will include planning for emergencies related to operational discharges or dam-related infrastructure failure.

# DAM SAFETY RESOURCES



## *DSS-WISE Fact Sheets (December 2018)*

DSS-WISE™ Lite is a web-based, automated two-dimensional dam-break flood modeling and mapping capability developed by the National Center for Computational Hydroscience and Engineering (NCCHE), the University of Mississippi. The development of the web-based tool and its operation and maintenance is supported by the U.S. Federal Emergency Management Agency (FEMA).

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## *Region IV: Increasing Emergency Action Plans in Georgia (September 2019)*

Since the National Dam Safety Program (NDSP) was codified in 1995, the number of high-hazard dams with EAPs has increased from 39 percent to 80 percent. To achieve this reality, SDP, a subsection of the Georgia Department of Natural Resources, applied for Federal Emergency Management Agency (FEMA) National Dam Safety Program (NDSP) grant funding. SDP developed an awareness, outreach, and training program to help dam owners develop and submit EAPs to the State.

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## INDEX OF FEMA NATIONAL DAM SAFETY PROGRAM PUBLICATIONS

### *2019 NDSP Technical Seminar Presentations*

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*Dam Safety and Risk MAP / Flood Mapping Studies Fact Sheet Series*

*Dam Safety Collaborative Technical Assistance (CTA) Summary Sheets*

*Dam Safety in the United States: A Progress Report on the National Dam Safety Program*

*Dam Safety Technical Advisories*

*DSS-WISE Fact Sheets*

*Emergency Action Planning Video*

*Emergency Operations Planning: Dam Incident Planning Guide*

*FEMA B-821 – National Dam Safety Program Annual Year in Review 2012*

*FEMA DR-SC-4241 – FEMA Mitigation Dam Task Force Strategic White Paper on Dam Risk*

*FEMA L-262 – The National Dam Safety Program: 25 Years of Excellence*

*FEMA L-263 – Dam Owner’s Guide to Plant Impact on Earthen Dams*

*FEMA L-264 – Dam Owner’s Guide to Animal Impacts on Earthen Dams*

*FEMA L-266 – Conduits through Embankment Dams: Best Practices for Design, Construction, Identification and Evaluation, Inspection, Maintenance, Renovation, and Repair*

*FEMA P-64 – Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners*

*FEMA P-65 – Federal Guidelines for Dam Safety: Earthquake Analyses and Design of Dams*

*FEMA P-93 – Federal Guidelines for Dam Safety*

*FEMA P-94 – Federal Guidelines for Dam Safety: Selecting and Accommodating Inflow Design Floods for Dams*

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*FEMA P-316 CD – Model State Dam Safety Program*

*FEMA P-333 – Federal Guidelines for Dam Safety: Hazard Potential Classification System for Dams*

*FEMA P-473 – Technical Manual for Dam Owners: Impacts of Animals on Earthen Dams*

*FEMA P-484 – Technical Manual: Conduits through Embankment Dams*

*FEMA P-534 – Technical Manual for Dam Owners: Impacts of Plants on Earthen Dams*

*FEMA P-535 – National Dam Safety Program Research Needs Workshop: Seepage through Embankment Dams*

*FEMA P-536 – National Dam Safety Program Research Needs Workshop: Dam Spillways*

*FEMA P-537 – National Dam Safety Program Research Needs Workshop: Spillway Gates*

*FEMA P-538 – National Dam Safety Program Research Needs Workshop: Hydrologic Issues for Dams*

*FEMA P-539 – National Dam Safety Program Research Needs Workshop Report: Outlet Works*

*FEMA P-540 – National Dam Safety Program Research Needs Workshop: Impacts of Plants and Animals on Earthen Dams*

*FEMA P-541 – National Dam Safety Program Research Needs Workshop: Embankment Dam Failure Analysis*

*FEMA P-602 and P-602 CD – Final Report on Coordination and Cooperation with the European Union on Embankment Failure Analysis*

*FEMA P-608 – Emergency Action Planning for State Regulated High-Hazard Potential Dams: Findings, Recommendations, and Strategies*

*FEMA P-609 CD – Training Aids for Dam Safety (TADS): A Self-Instructional Study Course in Dam Safety Practices*

*FEMA P-675 – Technical Manual: Plastic Pipe Used in Embankment Dams*

*FEMA P-713 – Risk Prioritization Tool for Dams*

*FEMA P-717 DVD through P-722 DVD – Expert Video Series*

*FEMA P-911 – Pocket Safety Guide for Dams and Impoundments*

*FEMA P-916 – National Dam Safety Program Strategic Plan*

*FEMA P-919 – Summary of Existing Guidelines for Hydrologic Safety of Dams*

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

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*FEMA P-1025 – Federal Guidelines for Dam Safety Risk Management*

*FEMA P-1032 – Evaluation and Monitoring of Seepage and Internal Erosion*

*FEMA P-1038 – National Dam Safety Program Annual Year in Review 2013*

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FEMA