



INDIANA DAM SAFETY INSPECTION MANUAL

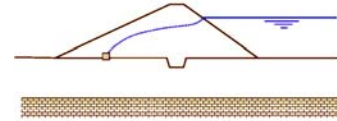
UPDATED 2007

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DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER
INDIANAPOLIS, INDIANA

INDIANA DAM SAFETY INSPECTION MANUAL



UPDATED 2007

Preface

The Indiana Dam Safety Inspection Manual is based on accepted practice and consists of information developed from existing documentation on dam safety inspections obtained from state and federal agencies. Dam safety is a complex and multi-disciplinary practice that continues to evolve as professionals gain a better understanding of how the various dam components behave under different loading conditions and how society's level of risk tolerance changes with time. This manual is a "living document" that will change to reflect evolving national practice. As this manual improves with time, it will provide a stable reference for good dam safety inspection practice as administrators, program priorities, and statutes change. The manual consists of five separate parts:

Part 1 describes ownership responsibilities and roles, risks and hazards of dam failure, and provides a detailed overview of dams in Indiana.

Part 2 presents guidelines for operating and maintaining a dam, including specific instructions on how to prepare a management and maintenance plan and how to respond to emergencies.

Part 3 provides guidance on evaluating dam safety and performing dam inspections. It covers who should perform the inspections and how, and provides guidance on identifying and reporting dam deficiencies and problems.

Part 4 describes guidelines for preparing Emergency Action Plans (EAP) to guide the dam owner during emergency situations. It also covers Emergency Response planning.

Part 5 is a compilation of Dam Safety Fact Sheets that present information on a variety of dam operational issues, such as seepage, slope protection, embankment stability, and spillway design, to name a few.

This manual should not be used in lieu of appropriate dam safety technical courses or training by a dam safety professional in the area of dam inspection. However, it should be used by experienced dam safety professionals as a reference and reminder of the aspects required to make a thorough dam safety inspection and evaluation. It should be stressed, however, that inspections alone do not make a dam safe; timely repairs and maintenance are essential to the safe management and operation of every dam.

The dam owner is responsible for maintaining the dam in a safe condition, and should do whatever is necessary to avoid injuring persons or property. As once stated by a highly respected legal scholar, "It is clear that compliance with a generally accepted industry or professional standard of care, or with government regulations, establishes only the minimal standard of care. Courts may assess a higher standard of care, utilizing the "reasonable person" standard and foreseeability of risk as the criteria. It is fair to say that persons who rely blindly upon a governmental or professional standard of care, pose great danger to others, and present a legal risk to themselves, when they know or reasonably should know that reasonable prudence requires higher care."

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Acknowledgements and Disclaimer

This Manual was developed by Christopher B. Burke Engineering, Ltd. (CBBEL) for the Indiana Department of Natural Resources (IDNR), Division of Water. Principal editors, authors, and support staff within CBBEL included: Siavash E. Beik, P.E. (Project Manager & Technical Editor), Ken Bosar, P.E. (Principal Author), and Jon Stolz, P.E. (Technical Consultant). Principal reviewers and project coordinators at the Division of Water included Kenneth E. Smith, P.E. (Assistant Director) and George Crosby, P.G. (Manager, Dam and Levee Safety Section).

A four-member peer review team provided technical review and advice during the preparation of the manual. The team members included Charles Rucker P.G., Robert Biel, P.E., Thomas Hugenberg, P.E., and John Pfeifer, P.E., all former Army Corps of Engineers dam safety professionals.

Much of the material presented in the manual was adapted from various publications developed by Federal and State agencies for dam inspection, operation, and maintenance. In many cases, pertinent text and illustrations were directly utilized within the manual with permission. A complete list of these publications is provided in the Appendices under References. The photographs were primarily obtained from IDNR and CBBEL files for Indiana dams; some photographs were obtained from public sources. The following is a list of agencies whose publications were extensively used in the preparation of this handbook:

[Indiana Department of Natural Resources](#)
[Association of State Dam Safety Officials](#)
[U.S. Army Corps of Engineers](#)
[U.S. Department of Agriculture Natural Resources Conservation Service](#)
[U.S. Department of the Interior, Bureau of Reclamation](#)
[Wisconsin Department of Natural Resources](#)
[Ohio Department of Natural Resources](#)
[Colorado Division of Water Resources](#)
[Pennsylvania Department of Environmental Protection](#)

Special recognition is given to the [Federal Emergency Management Agency \(FEMA\)](#) who provided funding to the IDNR for the development of this manual. Special recognition is also given to the [Association of State Dam Safety Officials \(ASDSO\)](#) for their leadership in developing effective dam safety programs and policies for the furtherance of dam safety. Their diligence in assisting the U.S. dam safety community was an important factor in the issuance of the FEMA grant.

Use of trade names, brand names, or drawings designating specific products is for reference purposes only and does not constitute an endorsement of products or services by CBBEL, review team members, the State of Indiana, or any of the cooperative agencies/organizations. Information describing possible solutions to problems and concerns, repairs, and emergency actions are intended for guidance only. The dam owner should seek qualified professional help for construction of new dams and extensive remedial measures for existing dams. Site-specific plans, emergency actions, and repair procedures should be developed on a case-by-case basis; CBBEL, review team members, the State of Indiana, any of the cooperative agencies/organizations and references cited assume no responsibility for the manner in which the contents of the Manual are used or interpreted, or the results derived therefrom. Current IDNR regulations pertaining to dams should take precedence to information contained within this Manual.

How to use this Manual

The Indiana Dam Safety Inspection Manual was prepared to assist dam owners, dam safety inspectors, and dam safety professionals in their endeavors to maintain and/or help maintain a safe and stable dam. It can also be used by prospective dam owners to gain insight into the issues that will confront them if they become dam owners. Although its primary focus is on dam safety inspections, this Manual may also be used as a reference for anyone wishing to gain a basic understanding of dams and the potential safety issues that dams present. The Manual is not intended to be a design guide or a comprehensive handbook for dam operation and maintenance, although it does provide guidance on minimizing safety concerns and on the preparation of a dam management and maintenance plan. Furthermore, this Manual should not be used to replace the services of a qualified dam safety professional when dam safety issues arise, such as performing dam inspections, trouble shooting problems, or recommending repair or remedial measures.

Part 1 of the Manual provides an overview of dams and the dam owners' role and responsibilities. Dam owners and prospective dam owners should begin with Part 1 to gain a basic understanding of dams and safety issues that are posed by dams. Part 1 includes a discussion of the current state regulations and hazard classification system used to classify dams as low, significant, or high hazard structures. Part 1 also presents guidelines for preparing an emergency response plan.

Part 2 is intended for use by dam owners or their maintenance consultant/personnel to help them prepare a Management and Maintenance Plan, and includes general procedures to help the dam owner operate and maintain their dams. Part 2 includes an overview of procedures for responding to emergency situations, a summary of typical dam instrumentation, and a detailed outline of concrete repair procedures.

Part 3 is the core of the Manual, and is intended for use by experienced dam safety professionals and inspectors to prepare for and conduct a dam safety inspection. Part 3 can also be used by dam owners wishing to gain more insight to the problems and concerns that may be present at their dams.

Part 4 contains guidance on preparing Emergency Action Plans (EAP) and Emergency Response Plans (ERP). It is intended for use by dam owners and dam safety professions. It contains a template EAP that can be used by the dam owner to prepare a plan for their dam without the need for extensive professional help.

Part 5 contains a compilation of Dam Safety Fact Sheets, which are a series of individual articles on dam safety concerns and construction materials. Part 5 is intended for use by dam owners who are interested in a summary of specific issues. Dam safety professionals and inspectors may also use Part 5 as a quick reference to aide them during their safety inspections or to supplement Part 3. The Fact Sheets are designed as stand-alone documents and are convenient tools for field use.

Experienced dam safety professionals/inspectors would find Part 3 most useful and pertinent to what they have been retained to do. However, they may still want to peruse the remaining parts of the manual to familiarize themselves with other issues important to the overall safety of the dam and the dam owner's needs. Most dam owners (or prospective dam owners) may want to primarily focus on material provided in Parts 1 and 2. Dam owners can use Part 4 to prepare Emergency Action Plans; an EAP template is included to simplify preparation. Part 4 also defines the need for a separate Emergency Response Plan during emergency situations. The manual users may also find it useful to refer to fact sheets provided in Part 5 to learn about a specific issue of interest in regards to the subject dam. Dam owners or their maintenance personnel/consultant who are already familiar with dams and dam ownership responsibilities may want to go directly to Part 2 to help them set up a comprehensive Management and Maintenance Plan or to get general help in various maintenance and repair methods.

**Indiana Dam Safety Inspection Manual
Revisions**

Revision No.	Date	Revisions Made
0	Aug 28, 2003	First Edition published and placed on IDNR web site.
1	Aug 28, 2007	General grammatical revisions throughout; updated for new dam regulations and policy; added new Part 4, Emergency Preparedness; the original Part 4, Dam Safety Fact Sheets, has been renumbered as Part 5; revised Fact Sheets 1, 9, 11, 14, 17; revised front covers and prefaces; revised Table of Contents.

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