



Dam Safety Division

Guidelines for Inspection of Dams

Mississippi Department of Environmental Quality
Office of Land & Water Resources

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Introduction

The Dam Safety Regulations (11 Miss. Admin. Code Pt. 7, Ch. 3) require that owners of high hazard and significant hazard dams have their dams inspected by an engineer familiar with design and inspection of dams who is registered with the State of Mississippi Board of Licensure for Professional Engineers and Surveyors. These inspections must be done at intervals specified by the Commission using the Mississippi Dam Safety Program's forms and guidance.

The Mississippi Dam Safety Program is implemented by the Department of Environmental Quality, Office of Land & Water Resources. The mission of the program is to protect downstream lives and property from the consequences of a dam failure. A primary means of achieving this goal is through maintenance and periodic inspection of dams.

These inspections are intended to identify conditions that may adversely affect the safety and functionality of a dam and its appurtenant structures; to note the extent of deterioration as a basis for long term planning, periodic maintenance or immediate repair; to evaluate conformity with current design and construction practices; and to determine the appropriateness of the existing hazard classification. The professional engineer performing the inspection should, where appropriate, recommend subsequent investigations required to resolve uncertain conditions and corrective measures to enable the dam to continue to perform its intended functions.

Inspection Guidelines

These inspection guidelines are designed to assist the dam owner to better understand the requirements, responsibilities, and duties inherent with dam ownership and to assist the professional engineer by providing a consistent approach to dam inspection and in-service evaluation.

Several different types of dam inspections can be performed. Dams and appurtenances should be inspected regularly to identify conditions that may adversely affect the safety of a dam and its ability to perform intended functions. An inspection may include the periodic evaluation of the as-built dam to insure conformity with current design and construction practices.

Dam Classifications

There are three (3) hazard classifications for dams (high, significant, and low) as defined below:

- High hazard dams are those dams in which failure may cause loss of life, serious damage to residential, industrial, or commercial buildings; or damage to, or disruption of, important public utilities or transportation facilities such as major highways or railroads. Dams proposed for construction in established or proposed residential, commercial, or industrial areas will be placed in the high hazard category, unless the applicant provides convincing evidence to the contrary.

- Significant hazard dams are those dams in which failure poses no threat to life, but may cause significant damage to main roads, minor railroads, or cause interruption of use or service of public utilities.
- Low hazard dams are those dams which failure would at the most result in damage to agricultural land, farm buildings (excluding residences), or minor roads.

Types of Inspections and Requirements

Formal Inspection – The inspection and performance evaluation (risk analysis) of high hazard and significant hazard dams to review and determine the safety and integrity of the dam and appurtenant structures. A formal inspection may involve many specialists such as geologists, hydrologists, surveyors, divers, ROV camera operators and others to evaluate individual features and conditions, however, the overall inspection and report must be supervised and prepared by a qualified Mississippi licensed professional engineer with experience in dam design and construction. Formal inspections shall include, but are not limited to, the following:

➤ **Detailed Field Examination**

- Mississippi Dam Safety program inspection report forms or approved equivalent completed with a photographic record of the inspection as well as a plan and profile drawing of the dam showing the location and extent of any deficiencies noted. Descriptions should be very precise and complete enough so that current conditions can be understood by the Dam Safety Program.
- A survey of the dam and appurtenant structures must be conducted by a qualified Mississippi licensed professional surveyor and the survey compared to previous surveys to evaluate settlement and deformation.
- Any conduits in the embankment must have a video or physical inspection. This includes drain pipes for filter drains. Detailed underwater inspections should be included as needed.
- Any instrumentation shall be read and a summary of current and any available previous readings shall be included with the inspection report.

➤ **Records Review and Analysis**

- A thorough review of the records on project design, construction, and performance. Any information on the dam maintained by the owner and all DEQ records shall be reviewed.
- A review of prior owner's and formal inspection reports shall be undertaken to evaluate trends in performance.
- Long-term patterns revealed by instrumentation should be closely examined and evaluated.

- If unknown, spillway capacities shall be calculated and a complete Hydrologic and Hydraulic report shall be submitted.
- An approved Emergency Action Plan (EAP) and Operation and Maintenance Manual (O & M) shall be confirmed and their adequacy determined. If an O & M manual and/or EAP has not been prepared, then one shall be prepared as part of the inspection.

The inspection report along with any supporting documentation shall be submitted to the Mississippi Dam Safety Program for review and approval.

Owner’s Inspection – The annual inspection of a dam by the owner to detect signs of deterioration in material, weaknesses or unsafe hydraulic or structural behavior and to record the progress of any repairs or correction of deficiencies noted in previous inspection reports. Any instrumentation data that can be read by the owner shall be reviewed and evaluated per instructions in their Operations and Maintenance Manual and the results noted in the inspection report. The inspection report shall be completed using Mississippi Dam Safety Program approved forms and submitted to the Mississippi Dam Safety Program, along with a photographic record of the inspection, for review and approval.

Informal Inspection – A visual inspection of the dam by the dam owner or operator which is done periodically in order to spot any developing problems. Informal inspections require that personnel conducting the inspection be knowledgeable about the dam and its appurtenances. An informal inspection must be performed every 60 days for high and significant hazard dams as well as after significant storm events. No reports are required to be made to the Dam Safety Program unless a problem with the dam is discovered and a potential failure situation may result. Personnel from the Mississippi Dam Safety Program will also perform informal inspections on selected dams in order to inspect the progress of any construction work, or to gain more information in order to evaluate their performance.

Emergency Inspection – An emergency inspection is an unscheduled inspection of a dam and its appurtenances necessitated by a potentially natural event such as a large flood, earthquake or when a condition develops that appears to threaten the safety of the dam. An emergency inspection is applicable to any hazard classification. Any required emergency repairs resulting from an emergency inspection should be conducted in compliance with 11 Miss. Admin. Code Pt. 7, Ch. 3.

Documentation of Deficiencies – When documenting deficiencies for any inspection, use the acronym “SMPL” as a guide:

S – Sketch the deficiency and describe its characteristics

M – Measure the deficiency and record the dimensions

P – Photograph the deficiency

L – Locate the deficiency in relation to a standard reference point and record the precise location in the report

Resources

The Dam Safety Program has training and reference materials on conducting dam inspections, instrumentation, creating an operation and maintenance program, evaluation of stability and deformation, evaluation of seepage as well as resources for other aspects of dam design, construction, operation and emergency planning. These resources are on our website, in manuals as well as on DVD and VHS and are available for engineers and dam owners to borrow. Please contact the dam safety program to obtain a complete list of resources or to borrow materials. Mississippi Dam Safety Program personnel are also available to provide training to owners and operators.

Inspection Reports and Qualifications of Inspection Personnel

Formal dam inspections must be led by a qualified professional engineer. The term “qualified engineer”, as used in these guidelines is intended to mean an individual who:

1. Is a licensed Mississippi professional engineer.
2. Is competent in dam investigation, design, construction, and operation for the type of dam being inspected.
3. Understands the failure mechanisms for the dam being inspected.

Formal dam inspections may call for other technical specialists. If any of these specialists are required to be registered in accordance with state law or certified in accordance with their association’s rules, then their report must be fixed with their seal and signature and attached to the inspection report. Geological reports must be signed and stamped / sealed by a Mississippi Registered Professional Geologist in accordance with state law. Surveys of the dam for inspection purposes and establishment of survey monuments for instrumentation purposes must be conducted by a Mississippi Registered Land Surveyor and be sealed in accordance with state law. Any drilling for sub-surface exploration must be done by a Mississippi licensed driller and a copy of the driller’s form with their signature and license number included.

The text of the report on the condition of a dam shall provide all relevant dam and dam related facts, findings, conclusions, recommendations, and data. In addition, each report shall contain clear, color photographs with each photograph indicating the date it was taken and the photograph location. The inspection report shall be completed using the inspection forms which can be found on the dam safety page of the website (www.deq.state.ms.us).

Inspection reports for high hazard and significant hazard dams shall be submitted within ninety (90) days of the completion of the inspection. Informal inspections may be performed by the dam owner or operator and the resulting inspection report shall be a part of the owner’s or operators’ permanent file. Unless specifically requested, informal inspection reports do not need to be submitted.