



Association of State Dam Safety Officials

Owner-Responsible Periodic Inspection Guidance

Considerations for Implementing an Owner-Responsible Periodic Inspection Program

As outlined in the 1998 Model State Dam Safety Program, an effective inspection program relies on regular periodic inspections conducted by state personnel as well as owners and their consultants. Inspections conducted by the state provide an independent and unbiased review of the dam. This program also depends on dam owners and/or their consultants to provide complimentary and necessary inspections and surveillance.

Shrinking state budgets and the trend toward privatization of government services have led a few states to depend more heavily on inspections conducted by private consulting engineers hired and paid for by the dam owner. These types of programs, referred to here as Owner-Responsible Inspections, have more emphasis on the owner and/or their consultants as the primary source of the review. The state plays a reduced role for the inspection and review of the dam, but provides direction, enforcement, quality control and policy for consistency.

In any case, inspections by owners and states should compliment each other. This document provides guidance on how to develop an owner-responsible inspection program.

Owner Responsibilities. An owner-responsible inspection program must clearly define the owner's responsibilities for operation, maintenance and inspection of the dam. The following is an outline of a dam owner's responsibilities both generally and specific to inspection of their dam.

The dam owner and heirs, successors, or assigns shall be responsible for the safety of the dam, and the ongoing operation, maintenance, surveillance, and periodic inspection. The owner shall do all of the following.

- 1) Provide for surveillance of the dam. The level of surveillance will depend on the size, condition and hazard classification of the dam.
- 2) Measure or read appropriate instrumentation and record and evaluate the data at specified time frames.
- 3) Promptly notify the state dam safety program of any unusual observations. Unusual observations may be indications of distress.
- 4) Inspect the dam and its appurtenances:
 - a. On a regular periodic schedule based on size, condition and consequence of failure, and
 - b. During and after any unusual loading including, but not limited to, significant storm/runoff events or earthquakes, to determine if structural or operational problems exist.

- 5) Maintain records for the dam, including but not limited to construction plans and documents, engineering studies, inspection reports, monitoring records, photos, the emergency action plan, and the operation and maintenance manual.
- 6) Obtain the services of a qualified professional engineer or have qualified in-house staff to inspect the dam as required by state regulations.

Professional Engineer Qualifications. Dam inspections must be performed by a qualified, professional engineer. The term “qualified engineer,” as used in these guidelines is intended to mean an individual who meets all of the following.

- 1) Is a licensed professional engineer.
- 2) Is competent in items related to dam investigation, design, construction, and operation for the type of dam being inspected.
- 3) Has at least ten years of relevant experience in dam investigation, design, construction, operation, and evaluation.
- 4) Understands the effects of adverse dam incidents and failures and the potential cause of failures.
- 5) Continues with the necessary training as outlined in the 1998 Model Program, Chapter III, Section 1.C. (Note that the Model Program has an error in this area, i.e. there are 2 Sections 1.C)

State Responsibilities. The State should continue to be responsible for the following: Identification of jurisdiction, inventory, assigning hazard classification and developing required frequency of inspections. Recommendations for these issues are outlined in the 1998 Model, Chapter III, Section I. The State should also develop policy and standards and conduct quality assurance as outlined below:

A. Formal Periodic Inspection Standards. To help ensure quality and consistency among owners and consultants the State should develop standards, and require the use of standard inspection checklists and report formats. Sample checklists are attached. Suggested inspection standards are as follows:

- 1) The professional engineer conducting the formal periodic inspection shall do all of the following.
 - a. Review all documents, studies, plans, photos, etc. related to the dam and its appurtenances. This shall include a review of the Operation and Maintenance Plan, previous inspections, and the Emergency Action Plan (EAP).
 - b. Provide an assessment of the need for hydrologic, hydraulic, stability and structural calculations and perform them as necessary to provide an accurate assessment of the condition of the dam.
 - c. Evaluate the instrumentation data collected.
 - d. Determine if additional development has occurred within the downstream reach that may change the hazard classification or require amendments or additions to the emergency action plan.
 - e. Provide recommendations regarding the completion of an underwater inspection of relevant portions of the dam and its appurtenances.

Underwater inspections are not generally required unless it is the best means to evaluate visual evidence of problems below the water level.

- f. Visually inspect outlet works and conduits if they are of adequate size and can be accomplished in conformance with OSHA's confined space requirements. Video inspections of conduits is an alternative to the visual inspection. Video inspections of conduits are not generally required unless it is the best means to evaluate other evidence of problems in the conduit.
 - g. Prepare an inspection report detailing all visual observations of the embankment, spillway, outlet, appurtenant structures and reservoir conditions at the time of inspection. The report shall include findings, recommendations, and proposed actions.
 - h. Photographs of the dam, showing specific observations or problem areas must be included in the report with site name and date.
 - i. The consultant is expected to provide recommendations for all deficiencies identified, and to direct specific attention to conditions reported in previous reports and corrections required by the dam safety program.
- 2) The professional engineer conducting the periodic inspection shall use a standard inspection report form provided by the dam safety program, and shall inspect all of the following and other items as necessary:
- a. Embankment, including stability, alignment, and seepage;
 - b. Abutments
 - c. Concrete Dams and galleries
 - d. Spillways and outlet works, including alignment, pipe joints, seepage, and the outlet channel (comply with OSHA confined space requirements);
 - e. Intakes
 - f. Valves and Gates
 - g. Instrumentation
 - h. Concrete;
 - i. Mechanical equipment;
 - j. Trash racks;
 - k. Emergency spillways
 - l. Reservoir rim;
 - m. Penstocks;
 - n. Other components and appurtenances.
 - o. Observe an exercise of valves, gates and other operating equipment as necessary to demonstrate proper functioning.

B. Quality Assurance/Quality Control. A Quality Assurance/Quality Control (QA/QC) procedure conducted by the state is important to help ensure that formal inspections are being conducted in accordance with the standards. The state should implement the following measures. Recommended staffing needs for QA/QC are presented in a table attached to this guidance.

- 1) The dam owner should be required to sign an annual statement indicating that the dam is being maintained in accordance with the approved maintenance plan and that the emergency action plan, if required, has been exercised and updated as necessary.

- 2) The state shall have the authority to make inspections and inspect records and manuals with proper notice.
- 3) The state program should promptly review all submitted reports and requirements.
- 4) The state should make independent periodic field inspections of jurisdictional dams to verify the findings of the owner's inspection.
- 5) The state should require more frequent or follow-up inspections by the owner's engineer if conditions indicate that more frequent inspections are necessary to assure adequate protection of life and property.
- 6) The state should document deficiencies by letter to the owner with specified time frames for abating the deficiencies consistent with recommendations of the inspection report. See the documentation guidelines in Chapter III, Section I.C of the March 1998 Model State Dam Safety Program. (Note that the Model Program has an error in this area, i.e. there are 2 Sections 1.C)
- 7) In order to ensure the effectiveness of an owner-responsible inspection program, the state dam safety program should have enforceable regulations related to performance of owner inspections. Refer to Chapter IV of the March 1998, Model State Dam Safety Program for specific guidance.

Owner-Responsible Inspections – State Dam Safety Program QA/QC Staffing Needs (values given in hours per dam)

Task	Clerical	Project Engineer	Engineering Review
Collect & file inspection reports & certifications	0.1		
Review reports & certifications & prepare follow-up letters		2	0.1
Follow-up inspection	0.5	8	1
Enforcement			
Reminder letter	0.5		
Hearings		4	1

Hours presented are estimates for each type of staff member per owner-responsible inspection. Each program can select tasks from this guide and apply the number of dams to determine total staffing needs. The estimated time for the project engineer's follow-up inspection and documentation does not include travel time.