

CECW-EP

Regulation  
No. 1110-2-100

15 February 1995

**Engineering and Design  
PERIODIC INSPECTION AND CONTINUING EVALUATION  
OF COMPLETED CIVIL WORKS STRUCTURES**

**1. Purpose.**

This regulation provides the policy, defines the objectives and responsibilities, and establishes the procedures by which the Corps of Engineers assures the safety, continuing structural integrity, and operational adequacy of its major Civil Works projects.

**2. Applicability.**

This regulation applies to all HQUSACE elements, major subordinate commands (MSC), districts, and field operating activities having responsibility for Civil Works projects.

**3. References.**

- a. Federal Guidelines for Dam Safety, dated June 25, 1979.
- b. Federal Power Act (41 Stat. 1063, U.S.C. 791-823), 10 June 1920, as amended (FPA).
- c. Water Resource Development Act of 1986, PL 99-662.
- d. AR 335-15, Management Information Control System.
- e. ER 1110-2-101, Reporting of Evidence of Distress of Civil Works Projects.
- f. ER 1110-2-110, Instrumentation for Safety - Evaluations of Civil Works Projects.
- g. ER 1110-2-111, Periodic Safety Inspection and Continuing Evaluation of USACE Bridges.
- h. ER 1110-2-1150, Engineering and Design for Civil Works Projects.

i. ER 1110-2-1156, Dam Safety - Organization, Responsibilities, and Activities.

j. ER 1110-2-1942, Inspection, Monitoring and Maintenance of Relief Wells.

k. ER 1130-2-339, Inspection of Local Flood Protection Projects.

l. ER 1130-2-419, Dam Operations Management Policy.

m. EM 1110-2-1908, Instrumentation of Earth and Rock Fill Dams.

n. EM 1110-2-2002, Evaluation and Repair of Concrete Structures.

o. EM 1110-2-4300, Instrumentation for Concrete Structures.

p. ETL 1110-2-231, Initial Reservoir Filling.

q. ETL 1110-2-346, Structural Inspection and Evaluation of Existing Welded Lock Gates.

r. ETL 1110-2-351, Structural Inspection and Evaluation of Existing Spillway Gates.

s. Policy Guidance Letter (PGL) No. 39, Responsibilities for Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R), dated 13 November 1992.

**4. Policy.**

a. Civil Works structures whose failure or partial failure could jeopardize the operational integrity of the project, endanger the lives and safety of the public or cause substantial property damage shall be periodically inspected and evaluated to ensure their structural stability, safety,

and operational adequacy. This policy will be accomplished as follows:

(1) The inspections and evaluations shall be supported by appropriate instrumentation programs that provide the timeliness and level of accuracy needed for evaluations under all operating conditions. During periods when a reservoir will be above the maximum pool of record or above a threshold level established from past performance, an appropriate team shall be dispatched to the dam to monitor and evaluate performance. A report of performance outlining the findings and evaluation shall be prepared and submitted to the MSC for review within 30 days after the event. Special inspections shall be performed during and immediately after any unusual loading events. Evaluation reports shall provide a basis for initiating timely remedial or rehabilitation measures.

(2) For those facilities constructed by the Corps and turned over to others for operation and maintenance, the operating entity is responsible for periodic inspection and evaluation. The Corps may conduct the inspection and write the report, on behalf of the Project Sponsor, provided appropriate procedural and financial reimbursement arrangements are made. The inspection will be conducted in accordance with appropriate guidance contained in the operation and maintenance manual for the facility and in accordance with applicable portions of this regulation. In the future, although the Project Cooperation Agreements (PCA) will include language on the inspection responsibilities, the operating entity shall again be notified, at the time of its acceptance of the structure, of the inspections and observations considered appropriate and its consequent responsibilities. Dams built by the Corps and turned over to others for OMRR&R shall have, in the O&M manual, requirements that the Corps will conduct the first and second inspections and/or first filling inspection in accordance with this regulation. See ETL 1110-2-231 for the initial reservoir filling and surveillance plan. This is to insure design/construction quality. See Policy Guidance Letter No. 39, dated 13 November 1992 for Corps and sponsor responsibilities. Under PL 99-662, Section 103, j(2)(B), the government may terminate or adjust the rights and privileges of the non-Federal interest to

project outputs under the terms of the agreement. See structural flood model PCA, Article VIII, Paragraph B and Article XIV.

(3) Under the authority of ER 1130-2-339, the Corps, at government expense, will participate in the inspection of a sponsor operated and maintained structure (e.g., local flood protection project) with the operating entity to assure that the operating entity is conforming to the requirements of the PCA, the agreed upon inspection program, and operation and maintenance program.

(4) In cases where the ownership of major elements of a project is divided between the Corps and other organizations, government or municipal, the Corps will inspect those features of the non-Corps elements which could adversely affect the stability, safety, or operation of the Corps-owned portion of the project. This includes features not constructed by the Corps.

(5) Non-Federal dams located upstream of a Corps project may have a substantial bearing on the safety of the Corps project. When structures of the Corps project are inspected, it may be appropriate to evaluate the safety of the upstream non-Federal dam(s) and to ascertain operational procedures or emergency situations which could make excessive demands on a Corps project. These structures should be inspected when their failure could cause overtopping of the Corps project and the upstream dam is not regulated by the Federal Energy Regulatory Commission (FERC) or by an active State Dam Safety Program. Every effort should be made to encourage owners of such projects to comply with the National Dam Safety Guidelines.

(6) Federally owned dams (non-Corps) on a military installation may have a substantial bearing on the safety of life and could endanger downstream property. The Corps may inspect such dams upon request from the installation having ownership or control of the facility. The inspections and reports shall be accomplished on a cost reimbursable basis. This policy extends to non-Federally owned dams on a military installation where the safety of life and Federal property is in jeopardy if a failure should occur. These inspections shall be performed and

documented in the same manner as the Corps dams.

b. It is essential that the Corps maintain institutional knowledge and technical expertise in the disciplines related to dam design and safety. An important component of this knowledge is gained by the conduct of periodic inspections by district engineering, construction, and operations personnel. Many "lessons" are learned over a long period of dam observations and analyses. These lessons are then applied by the multi-disciplinary inspection team to the design, construction, operation, and maintenance of existing and future projects. Since Districts must remain fully responsible for all decisions made as a result of the inspection program (the decisions are governmental functions that may not be contracted), it would be inappropriate to fully contract the inspection program. On the other hand, where manpower constraints exist, inspections may be augmented by contracts. Care must be taken to maintain in-house capability for the on-site conduct of the program and continue to keep the involved disciplines (design, construction, and operations personnel) fully integrated in project inspections.

## 5. Program Implementation.

Periodic inspection programs shall be established on the basis of project size, importance, or the potential hazard they present. MSC commanders are responsible for program management and oversight. District commanders are responsible to implement the requirements of this regulation.

a. Frequency of Inspections. Periodic inspections shall be conducted as outlined below:

(1) Dams and Appurtenant Structures. The guidance for developing the interval of inspections for dams and appurtenant structures is set forth in the following subparagraphs. This guidance does not preclude other intervals of inspection as the situation or structural integrity warrants, nor does this preclude the surveillance plan for the initial filling of Corps reservoirs as prescribed by ER 1110-2-1150 and ETL 1110-2-231.

(a) Initial Periodic Inspection. The first periodic inspection and evaluation of a new earth

and rock-fill dam shall be carried out immediately after topping out and prior to impoundment of the pool. The initial inspection of concrete dams shall be accomplished immediately prior to impoundment of reservoir water.

(b) Second Periodic Inspection. The second inspection for new earth and rock-fill dams shall be made at a reasonable stage of normal operating pool. The second inspection of concrete dams shall be made when the reservoir water attains the normal operating pool. In either case, no later than one year after initial impoundment has begun.

(c) Subsequent Periodic Inspections. Subsequent inspections for concrete structures, and earth/rock-fill dams and embankments will be made at one-year intervals for the following four years, at two-year intervals for the next four years and then extended to five-year intervals if warranted by the results of the previous inspections.

(d) Intermediate Inspections. For projects on a five-year cycle, an intermediate inspection of all or some of the features may be scheduled, if warranted. Selection shall be based on consequences of failure, age, degree of routine observation, a natural event such as an earthquake, performance record and history of remedial measures. Intermediate inspections shall also be made of any portion of a project exposed during dewatering that could not be accomplished during the scheduled periodic inspection and between periodic inspections for certain projects on a five-year cycle. A summary of intermediate inspections is to be included in the next periodic inspection report.

(e) Informal Inspections. Employees at the project are to make frequent observations of the dam and appurtenances and of operation and maintenance. The purpose is to identify and report abnormal conditions in accordance with training instructions and guidance. Any unusual conditions that seem critical or dangerous should be reported immediately using proper procedures and channels.

(2) Navigation Structures. The guidance for developing the interval of inspections for dams with locks is set forth in the following subparagraphs.

This frequency is different than for flood control dams because of the levels of risk involved. Normally the risks of a navigation dam failure would be the economic consequences due to loss of the navigation pool, instead of the risks to human life in downstream communities associated with the loss of a flood control reservoir. This guidance does not preclude other intervals of inspection as the situation or structural integrity warrants.

(a) **Initial Periodic Inspection.** The initial periodic inspection of navigation projects shall be made immediately prior to flooding of cofferdams, culverts or chambers.

(b) **Second Periodic Inspection.** A second inspection of new or major rehabilitated navigation projects shall be made no later than one year after the new operating pool has been attained.

(c) **Subsequent Periodic Inspections.** Subsequent inspections are not to exceed five years, without obtaining prior approval by HQUSACE.

(d) **Intermediate Inspections.** Intermediate inspections shall be made of any portion of a project exposed during dewatering that could not be accomplished during the scheduled periodic inspection. The intermediate inspection trip reports shall be included in the next periodic inspection report.

(3) **Other Corps Owned and Operated Structures.** This includes major levees, flood walls, pumping stations, and other pertinent civil works structures. The MSC is responsible for establishing the periodic inspection intervals of these items, but they are not to exceed five years without HQUSACE approval. The inspection intervals are to be defined within the Operation and Maintenance (O&M) manual prepared for each project. Such projects designed and constructed by the Corps, but operated and maintained by the sponsor, will have the inspection intervals defined in the O&M manual.

b. **Report.** A formal technical report of inspection, entitled Periodic Inspection Report of (project name) Project, shall be prepared for permanent record, reference, and as a basis for

needed remedial work for all periodic and intermediate inspections. This report shall be based on a detailed, systematic technical inspection and evaluation of each structure and its individual components regarding its safety, stability, and operational adequacy. See Appendix A for report content, format.

(1) Inspections or routine observations indicating that the safety of a structure is in jeopardy shall also be reported in accordance with ER 1110-2-101.

(2) Inspections indicating the necessity for project modifications, repairs, rehabilitation, replacement or need for further study beyond the scope of normal maintenance shall be reported to the MSC as part of the endorsement transmitting the report. Inspection reports of conditions requiring major modification shall contain a statement as to whether studies will be pursued under authority of the Major Rehabilitation Program, or the Dam Safety Assurance Program.

c. **Report Approval Authority.** MSC commanders are delegated authority to approve inspection reports. HQUSACE approval is required for periodic inspection reports only when a specific request is made by HQUSACE that the inspection report be submitted to HQUSACE for approval due to extraordinary circumstances.

d. **Report Submittal Schedule.** A periodic inspection report requiring HQUSACE approval is to be submitted (ATTN: CECW-E) by the MSC commander as follows: inspection reports shall be submitted within 60 days after the inspection. Reports Control Symbol (RCS) is exempt based on AR 335-15, paragraph 5-2e(8). For reports approved at the MSC level, the MSC commander may establish its submittal requirements. MSC shall submit one information copy of inspection reports to HQUSACE (ATTN: CECW-E) upon the resolution or incorporation of MSC's comments. The commanders of CEPOD and CENED, as operating MSCs will insure that their approval process includes an in-depth, rigorous review, in a manner similar to higher authority oversight. The MSC commander shall complete action on all periodic inspection and evaluation reports within 60

days after the initial receipt of the report. This should include satisfactory resolution to all review comments.

e. **Obligation to Others.** In those cases where ownership of major elements is divided between the Corps and others, information pertinent to the condition of project elements owned by others, as observed by the Corps inspection team, shall be furnished to the co-owner. The district will also furnish this information to the FERC, when hydro-electric power projects are under the purview of the Federal Power Act (41 Stat. 1063, U.S.C. 791-823) 10 June 1920, as amended (FPA). Owners of such FERC licensed facilities shall be advised that the information made available by the Corps will not be presented as representing results of inspections performed for the licensee by the Corps and is not a substitute for the FERC inspection under the FPA.

## 6. Instrumentation.

Instrumentation is essential in evaluating the performance and will be incorporated in the project structures as appropriate to measure and monitor forces, pressures, loads, stresses, displacement, alinement, plumb and other conditions related to monitoring the structural safety and stability. The scope of the instrumentation shall be indicated in the "Instrumentation" design memorandum and updated by subsequent inspections, evaluations and performance record. See EM 1110-2-1908 and EM 1110-2-4300 for instrumentation guidance.

## 7. Responsibilities.

a. The engineering division of the district office will be responsible for:

(1) Formulating the inspection plans, conducting the inspections, processing and analyzing the results of the instrument observations, evaluating the condition of the structures, recommending the schedule of the next inspection, and preparing and submitting the periodic inspection and evaluation reports.

(2) Preparing an annual report which summarizes the periodic inspection and evaluation program for the 12-month period ending 30

September. The report should include the number, type and list of structures inspected and district cost of inspections including reports, average cost of inspections, and a brief narrative on the major findings of both full periodic inspections and evaluations and interim inspections. This data is required for the biannual report to Federal Emergency Management Agency (FEMA) on the Corps Dam Safety program. The report shall be submitted to the MSC office by 31 October with information copy provided to HQUSACE (CECW-EP). The FEMA report covers Federal Agency dam safety activities on a FY basis, with agency input due to FEMA in December of each odd year.

(3) Coordinating with the operations division of the district offices to ensure that sufficient funding for inspections is requested in the Operations and Maintenance, General budget.

(4) Notifying operations division personnel of the inspection for their assistance and participation. For those projects or structures being inspected for the first time, personnel from the construction division shall be invited to participate. An invitation to the appropriate State Dam Safety official to attend the inspection shall be made. If hydropower is a feature of the project, FERC should be invited. Operations division personnel in turn are to ensure that project personnel are prepared for the inspection and provide support as necessary.

(5) Forwarding the approved periodic inspection and evaluation report to the district operations division for implementation of recommendations.

(6) Ensuring that the inspection team is comprised of the expertise necessary to execute a thorough and technically sound inspection. Needed expertise may be obtained from HQUSACE, other FOAs, or by contract. HQUSACE personnel will not normally participate in inspections unless requested or when project conditions dictate. See Appendix A, paragraph 3 for further details.

(7) Maintain assurances that sponsors with OMRR&R responsibilities are performing as required under the PCA agreements.

b. The engineering directorate of MSC offices shall provide oversight and management for this program. The director of engineering is responsible for the selection and approval of structures to be included in the program and for maintaining a list of the selected projects and structures, maintaining the five-year schedule of inspections, and the status of reports and recommendations. The inspection schedule shall be revised annually, and shall contain the dates of inspections for the coming fiscal year. As a minimum, the MSC office shall:

(1) Provide representation at the first and second inspections, the inspection of high hazard structures, inspections of structures that have experienced a change in operation such as a change in the normal pool level or structures that have experienced a pool of record, inspections of dewatered structures, gates and operating equipments, and inspections of structures whose condition or performance has warranted more frequent attention.

(2) Provide the review and monitoring of data collection, processing, evaluation, and inspection activity.

(3) Determine the frequency and scope of future inspections, and maintain the inspection schedule.

(4) Establish and maintain an MSC-wide database which will include periodic inspection schedules and history of project remedial measures. The history of remedial measures that are implemented by hired labor or contract will include project deficiencies, status of deficiencies, completion dates, estimates, actual expenditures,

funding sources and priority levels.

## 8. Program Review.

At the end of each fiscal year, the district shall review and set priorities for the recommended actions from this program for the next budget submission.

## 9. Reporting Distress.

Refer to ER 1110-2-101 for procedures when reporting evidence of distress.

## 10. Funding.


Funding for the periodic inspection report for each project shall come from the district's fiscal year allocation for the inspection and preparation of the report. Costs incurred by Headquarters and MSCs will be funded from the General Expense appropriation.

a. Funding for the inspection and evaluation program during the period of construction shall be under Cost Code 51, Appropriation 96X3122, Construction, General. The term "period of construction" is defined as the period from the issuance of the solicitation of the first construction contract to the date the District Engineer notifies the sponsor in writing of the government's determination that construction is complete.

b. Funding for the inspection and evaluation program after the project components are placed in operation shall be under Appropriation 96X3123, Operation and Maintenance, General.

FOR THE COMMANDER:

1 Appendix  
APP A - Inspection and Evaluation  
Program Procedures

  
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Chief of Staff