

APPENDIX A
INSPECTION AND EVALUATION PROGRAM PROCEDURES

1. Project Documentation.

All engineering data relating to project structures inspected should be collected and permanently retained in appropriate files at the project site and available to the inspection team during the inspection. Project engineering data shall also be retained at the district office. In the absence of on site administrative headquarters, the data shall be retained at the nearest field office. These documents and drawings shall be considered as permanent engineering data, subject to retirement or disposal only upon termination of operation of the project. These data shall consist of but not limited to the following:

- a. All previous Periodic Inspection Reports.
- b. Records of inspections by project personnel and interim inspections by district personnel.
- c. Design Memoranda to include principal design assumptions and stability and stress analysis, slope stability, seepage and settlement analyses, consolidation, shear, permeability, compaction, classification tests or summaries thereof, and contract plans and specifications.
- d. Typical as-built plans, elevation, and sections.
- e. Selected as-built drawings of important project features, to include details such as instrumentation, internal drainage, transition zones, or relief wells, and reports of any special investigations.
- f. Foundation data and geological features, including boring profiles, foundation mapping, and subsurface exploration results.
- g. Location of borrow areas and identification of embankment, filter, riprap, large stone sources.
- h. Laboratory Reports:
 - (1). As-built properties of foundation and

embankment materials, such as shear strength, unit weight, and water content and classification. The number of control tests and undisturbed record sample tests should be included.

- (2). Physical, chemical, and thermal properties of concrete and concrete materials.
- (3). Summary of concrete mixture proportions and control procedures.
 - i. Identification of concrete material sources.
 - j. Construction history records, including diversion schemes and construction sequences shown on appropriate drawings.
 - k. Details of the overall instrumentation program to include predicted performance and record of actual observations, and annual updated evaluations.
 - l. Operations and Maintenance Manual.
 - m. Water Control Manual.
 - n. Copy of PCA.
 - o. Dam Safety Information:
 - (1). Project copy of "Federal Guidelines for Dam Safety".
 - (2). Emergency Action Plans – complete with the emergency identification subplan (Federal), emergency operations and repair subplan (Federal), full scale inundation maps (Federal), notification subplan (Federal and non-Federal) and evacuation subplan (non-Federal).
 - (3). Records of dam safety training for project personnel.
 - (4). Surveillance plan of the project that includes events and threshold reservoir levels that initiate observations and/or inspections and reporting procedures.

- (5). List of local contractors and construction materials available for use in emergency situations.
- (6). Physical security plan for the project.
- p. Manufacturers data for purchased items.

2. Inspection Program.

a. Initial Pre-inspection Brochure. A technical brochure shall be prepared in advance of the first project inspection in order to familiarize inspection team members with general features of the project. In as much detail as possible, this brochure shall include a technical summary of the structural, material, and foundation conditions, instrumentation data, including settlement monuments, location of instrumentation and description of reservoir operations procedures, if pertinent. Also, the brochure shall include, as appropriate, pertinent project data, layout and typical section drawings, Federal and non-Federal responsibilities for OMR&R, summaries of sub-surface soil profiles and boring logs, and the checklist developed for conducting the inspection. Pre-inspection brochures shall be completed and distributed to inspection team members at least 30 days prior to the inspection date.

b. Pre-inspection Packets. A technical pre-inspection packet shall be prepared in advance of all subsequent project inspections in order to familiarize inspection team members with general features and history of the project. This packet should include a project access map, history of project deficiencies and remedial measures, technical summaries of the structural, material, and foundation conditions, and description of reservoir operations procedures, if pertinent. Also include plots of most recent instrumentation data, including settlement monuments, and location of instrumentation. Also, the packet should include, as appropriate, project data, layout and typical section drawings, Federal and non-Federal responsibilities for OMR&R, summaries of sub-surface soil profiles and boring logs, and the checklist developed for conducting the inspection. Packets may be tailored to each discipline to avoid excessive reproduction. Pre-inspection packets shall be completed and distributed to inspection

team members at least 15 days prior to the inspection date.

c. Inspection Procedures. A systematic plan will be established for the inspection and operation of those features related to the safety and stability of the structure and to the operational adequacy of the project. Operational adequacy means the inspecting, testing, operating, and evaluation of those components of the project whose failure or failure to operate properly could impair the operational capability and/or usability of the structure. Where the operation of these components is vital to the safe operation of the project under emergency conditions, these components will be operated by emergency power at least annually. Emergency generators should be tested under load on more frequent intervals to maintain their integrity. In addition, standby emergency generating systems shall be reviewed and tested during the scheduled inspection to assure the inspection team that all critical project features can be operated under emergency conditions or in the absence of the normal source of power. The testing of emergency power should include the maximum power demand that could be expected in emergency situations. As much as possible the operation and or inspection of all the features should be conducted during the scheduled inspection. The inspection of the remaining features may be conducted during a period of 30 days before the main inspection. Inspection of project features that are best scheduled more than 30 days in advance of the periodic inspection will require notification and approval of the engineering directorate of the MSC office. If appropriate, a video of the event could document pertinent results of the pre-inspection for showing at the regularly scheduled inspection. The systematic inspection plan shall also provide as appropriate, the examination and the operation of, but not be limited to, the following:

(1) Flood and outlet control gates (including flood gates in levees or flood walls), navigation lock gates and valves, emergency closure gates and bulkheads, associated hoists and operating machinery (including safety devices such as limit switches and fail-safe interlocks), flood control pumps and related equipment, and cathodic protection systems.

- (2) Structural details of roadways, parapets, retaining walls, spray walls, building walls and floors, conduits, intake towers, bridges to gate towers, piers, monoliths, steel sheet pile features.
- (3) Concrete surfaces.
- (4) Structural cracking and deterioration of material.
- (5) Joints and joint materials, including relative movement at joints between structures or portions of structures.
- (6) Water passages.
- (7) Foundation drains, joint drains, face drains.
- (8) Spillways, spillway buckets and stilling basins and outlet channels including submerged features as necessary.
- (9) Embankment cracks, bulging, and sliding.
- (10) Condition of abutment and embankment junctions.
- (11) Vertical and horizontal alignment of the embankment or structure crest, slope, or toe area.
- (12) Unusual movement or cracking at or beyond the embankment or slope toe.
- (13) Seepage through or under embankment or abutment slopes.
- (14) Sloughing or erosion of embankment or abutment slopes.
- (15) Condition of riprap, armor or other slope protection.
- (16) Reservoir rim conditions. (Can be limited to known areas of potential concern).
- (17) Conditions of relief wells, collector pipes, inspection manholes, or other features of seepage control systems. (ER 1110-2-1942).
- (18) Conditions of instrumentation, and most

recent measurements prior to the inspection. (ER 1110-2-110).

d. A detailed checklist shall be developed by each technical specialty for each structure in order to ensure an adequate examination coverage for each feature. The facility's instrumentation shall be included in the checklist to ensure that data are regularly collected and analyzed and to ascertain whether the instruments are in a proper operating condition.

e. Photographs. In order to more accurately portray conditions and changes in conditions of surfaces and structural details, color photographs are encouraged. In addition to photographs, video film is encouraged for use in monitoring areas of concern. This is especially useful for comparing movement, water leakages, wave action, etc.

f. Examination of Deteriorated Concrete Structures. If the inspection reveals the need for any type of in-depth evaluation to determine the cause of deterioration or malfunction and to make sound recommendations for remediation, the need for the investigation shall be stated in the periodic inspection report. Guidance on repair of concrete is given in EM 1110-2-2002.

g. Steel Structures. Steel structures shall be inspected for structural and operational adequacy. Those structures involved directly in the safety of the project shall receive special consideration. ETL 1110-2-346 and ETL 1110-2-351 provide guidance for such inspection and evaluation.

h. Riprap. Material sources which have unsatisfactory performance records shall be identified, reported and eliminated from further use.

3. Composition and Qualifications of Inspection Team.

Inspection team personnel will consist of individuals qualified by experience in the project management, design, construction, and operation of the project, and of individuals with appropriate specialized knowledge in structural, mechanical, electrical, hydraulic, and embankment design, geology, soil mechanics, concrete materials, and construction

procedures. A representative(s) of the sponsor is to be invited to be part of this team. In every case, the inspection team qualifications may vary with the complexity of the facility and with the level of inspection. All team members should receive training in the inspection procedures. Training Aids for Dam Safety (TADS) modules are recommended as a minimum for each team member, as well as a thorough understanding of this ER. The dam safety office of each MSC and district is responsible for scheduling this training.

4. Inspection Report Content.

The periodic inspection report shall present the results of each general project inspection. The title of this report should indicate the name of the project, watercourse, state, project features, and inspection number and date, in that order. An example of an appropriate title is: "Beech Fork Lake Project; Twelvepole Creek, West Virginia; Dam, Outlet Works and Spillway; Periodic Inspection Report No. 1, September 1992". Report No. 1 (report of initial inspection) shall provide a general project description and present the results of the initial inspection. Reports of subsequent inspections shall be supplementary to the initial report and will be numbered sequentially with the initial report; i.e., Report No. 2 would describe inspection number 2, etc.

a. Initial Report. To the extent possible, major elements of this report are:

(1) An executive summary of the major items found in the inspection. Include a statement stating the projects ability to continue acceptable and safe operation.

(2) A general project description including layouts and typical section for the purpose of familiarization with general features of the project.

(3) List of project documents and engineering data that identifies the status and location of the project documents.

(4) Results of examination for each feature, including a statement as to its ability to function as designed and copy of the completed inspection

checklist.

(5) Evaluation and summaries of the observations and inspection of instrumentation (ER 1110-2-110) and relief wells (ER 1110-2-1942) with comparison to design predictions and actual conditions that signal changes in the structures performance.

(6) Where appropriate, statements, or exhibits summarizing the duration and frequency of spillway and control gate operations, including heads or velocities, and number of lock filling and emptying operations.

(7) Technical assessment of the causes of distress, of abnormal conditions, and evaluation of the behavior, movement, deformation, and loading of the structure and its individual components. If such assessment can not be accomplished within the time allotted to complete the inspection report, a preliminary assessment should be discussed with a plan scheduled to complete the assessment.

(8) Color photographs with an appropriate caption, including the date taken.

(9) A discussion of the deficiencies, the proposed remedial measures, with sketches if appropriate, related maintenance operations and both the cost estimates and a completion schedule.

(10) A discussion of the overall structural and individual project components stability, safety, and operational adequacy compared to its intended purpose(s) for the conditions with and without the recommended remedial measures.

(11) Recommendations should indicate the required action, proposed schedule and priority of action, and proponent. Also recommendations for the next periodic inspection, including a proposed date for the inspection, should be indicated.

(12) Views of the non-Federal sponsor on any of the above should be included (if applicable).

(13) Appendices shall include, as appropriate: pre-inspection packets; trip reports; plots of instrumentation data; inspection checklist; results of

crack surveys; correspondence that documents the performance of the project; the results of special investigations; and the status and location of the project documents required by this regulation and ER 1130-2-419.

b. Subsequent Reports. Subsequent reports shall generally follow the requirements of paragraph 5.a below, however should also include:

(1) Brief summary of past performance and problems and concentrate on the new and continuing conditions that affect or may affect the overall safety and operational capability of the structure.

(2) A discussion on maintenance and remedial activities to include materials used, application techniques, and performance shall be included.

(3) A discussion on recommended remedial measures not completed since the previous inspection report will also be included.

(4) Copies of selected drawings should be included; however, extensive reproduction of previously published drawings shall be avoided. As a minimum, a location and vicinity map which also show project access shall be included, as well as a general plan which shows each feature discussed in the report. The names and stationing shall be consistent on the drawings, narrative, and photograph captions.

(5) A summary of the projects bridge inspections that may impact project safety or access during emergency conditions shall be included. ER 1110-2-111 provides guidance on bridge inspections.

5. Inspection Report Format.

a. Reports shall generally be organized as follows:

Table of Contents

1. Executive Summary, including a statement regarding the projects safety status for continued operation.

2. General Statement of Inspection Program (include statement on hazard classification and report approval authority).

3. Description of the Project.

4. Brief Project Summary.

- (a) Construction conditions.
- (b) Project characteristics.
- (c) History of remedial measures.
- (d) Deficiencies corrected since last inspection.
- (e) Past deficiencies not yet corrected.
- (f) Non-Federal sponsor OMRR&R responsibilities (if applicable).

5. Inspection Results. (Reference to trip reports or appendices is not acceptable).

6. Recommendations.

Appendices

I History of Remedial Measures.

II Photographs.

III Figures.

IV Inspection Checklist.

V Summary of Inspection Notes.

VI Intermediate Trip Reports (documentation only, not to replace the narrative in the body of the report).

VII Instrumentation Data and/or Plots. Data should contain all figures since the last inspection and have sufficient background data to support the report discussion, conclusions and recommendations. Reproduce the plan of instrument locations in each report. Cross-sections showing piezometric data should show design uplift assumptions along with the current pressure line.

VIII Results of Crack Surveys.

IX Listing of the status of engineering and

operation design data, manuals, reports and correspondence as required by this regulation, ER 1130-2-419 and others as deemed necessary to provide comprehensive project documentation.

X Status of Dam Operation Management Policy (DOMP) training. (ER 1130-2-419).

b. Text. All sections and paragraphs shall be numbered and lettered and shall be on 8 1/2 by 11-inch paper with a 1-inch margin on the left side. Reproduction shall be any available process with printing done head-to-head, if possible.

c. Drawings. Drawings or plates shall normally be 8 1/2 by 11-inch with sufficient margin on the left for binding. Foldouts normally shall not exceed 20 inches. Drawings and photos may be included in the text or placed entirely in the Appendix. However, any figure or drawing in the text should support the written material.

d. Binding and cover. Reports shall have flexible paper or card stock, hidden-hinge covers with fasteners that facilitate removal and insertion of pages and drawings. Information to be on the cover will be as described in paragraph 5 above.

Also, the name of the preparing agency and the date of inspection shall be shown on the cover.

6. Distribution of Inspection Reports.

a. Six copies of those reports to be approved by HQUSACE shall be submitted to CECW-EP. The views and recommendations of the MSC commander shall be included in the transmittal correspondence. Transmittal correspondence shall also state the MSC's position on the return of copies in excess of HQUSACE needs.

b. For those reports approved at the MSC level, the MSC Commander shall transmit to CECW-EP one copy of each report including submittal and approval correspondence. The approving officer shall receive the inspection report within 60 days after the inspection is completed.

c. Upon approval of the inspection report, one copy together with a copy of all correspondence bound under the front cover, will be sent by the originating district directly to the Waterways Experiment Station, ATTN: Research Center Library, 3909 Halls Ferry Road, Vicksburg, Mississippi 39180-6199. A copy of the transmittal letter to WES is to be provided to the MSC.